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THE NUTRITIVE VALUE OF INDIAN FOODS AND THE PLANNING OF SATISFACTORY DIETS

BY

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FIFTH EDITION

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NOTE ON THE FIFTH EDITION

The Fifth Edition contains only minor changes in the text. A few foodstuffs, recently analysed in these Laboratories and not reported upon earlier, are included; also figures for vitamin B_1 and riboflavin for a number of foodstuffs, either analysed in the Laboratories or collected from published work in India, are given.

Criticism had been levelled against the outmoded botanical equivalents given in the earlier editions to foodstuffs listed in the tables; they have been replaced by the modern and scientifically accepted equivalents, thanks to the publication of Drs. D. Chatterjee and G. S. Randhawa. Thanks are also due to Dr. C. Gopalan for helpful suggestions regarding the text and to Dr. L. S. S. Kumar for the Gujarati and Marathi equivalents of foodstuffs given in Appendix II.

COONOOR: V. N. PATWARDHAN

September, 1954. S. RANGANATHAN

NOTE ON THE FOURTH EDITION

The popularity of Health Bulletin No. 23 continues unabated. The third edition was published in 1941 and reprinted in 1946 with only minor alterations. During the last seven years, much new information bearing on the nutritive value of foods, requirements of energy, protein, minerals, vitamins, etc., had accumulated. The Nutrition Advisory Committee of the Indian Research Fund Association had recommended in 1944 certain scales of dietary allowances for Indians. All this information had to be incorporated in the new edition if the Health Bulletin were to continue to serve the object with which it was published. In consequence, some sections in the text had to be entirely recast and certain others enlarged. It was also found necessary to alter, in a few instances, the sequence of sections. It is felt that all these changes will materially add to the value of the Bulletin.

The Food Value Tables remain much the same as in the previous edition except for a few additional items under "Flesh Foods". In view of the growing importance of nicotinic acid and riboflavin, figures for these vitamins have been included for as many foods as possible. The authors are painfully aware of the many gaps here, but they hope to fill the lacunae in a future edition.

Appendix II includes in addition to Hindustani the equivalents in various other provincial languages. The authors' grateful thanks are due to Mr. P. V. Ramiah for helping with the Tamil and Telugu, Dr. B. Nayak for the Oriya, Dr. D. N. Chatterjee for the Bengali, Mr. Narayan Das for the Kanarese and to Dr. R. M. Mathew for the Malayalam equivalents.

V. N. PATWARDHAN
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INTRODUCTION TO FIRST EDITION

The purpose of this Bulletin is to summarise the available knowledge about the nutritive value of Indian foodstuffs for the benefit of public health workers, medical practitioners, superintendents of residential institutions and others interested in practical dietetics. With the help of the tables provided it is possible to work out "balanced diets" for individuals or groups. To do this, however, it is necessary to know what is meant by a "balanced diet". A brief statement outlining modern dietetic principles is, therefore, provided in the first sections of the Bulletin.

The bulk of the data presented is based on work carried out in the Nutrition Research Laboratories, Coonoor, where a special enquiry into the nutritive value of Indian foods has been financed by the Indian Research Fund Association. The Bulletin has been prepared in the Laboratories, and practically every member of the staff has contributed to the work on which it is based. Use has, however, also been made of scientific articles published in India and elsewhere (notably from the Department of Bio-chemistry and Nutrition, All-India Institute of Hygiene and Public Health, Calcutta, under Professor H. Ellis C. Wilson) which contain material of value. While a good deal more work is necessary on the nutritive value of Indian foodstuffs, sufficient data are already available to justify the publication of the Bulletin for use in practical nutrition work.

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THE NUTRITIVE VALUE OF INDIAN FOODS AND THE PLANNING OF SATISFACTORY DIETS

Introduction

Food is the prime necessity of life. There must be enough of it so that every individual is able to get what he needs. Such needs must be defined scientifically with due regard to vigorous growth, health and longevity requirements. So much has been learnt on the subject of food during the last four decades that the importance of correct feeding for a healthy life has been convincingly demonstrated. The planning of a satisfactory diet can, however, only be successful, if carried out on a scientific basis, for the knowledge that we possess to-day does not confirm the general belief that appetite is a safe guide for the selection of food. An attempt has, therefore, been made in the following pages to give a brief outline of the general dietetic principles governing the planning of a satisfactory diet; this has been done in a language which may be intelligible to the lay public.

Proximate Principles

Foods are divided into cereals, pulses, nuts and oilseeds, vegetables, fruits, milk and milk products, flesh foods and condiments and spices. They contain, in general, proteins, fats, carbohydrates, vitamins and mineral salts. Proteins, fats and carbohydrates are often termed "proximate principles" ; they are sometimes referred to as energy-yielding food factors, since they are "burnt" or oxidized in the body to provide the energy for life. Vitamins and mineral salts do not supply energy, but they play an important part in the physiological functions of the body. Water is also a necessary dietary element. Human beings, like other animals, require a sufficiency of these if they are to live and thrive. A well-balanced diet should contain the various factors in correct proportions.

In dealing with diet, it is well to remember the distinction between an *optimum* and an *adequate* diet. An optimum diet is one which ensures the functioning of the various life processes at their very best, whereas an adequate diet maintains these processes but not at their peak levels. While it is desirable to work up to standards laid down for an optimum diet, it is essential to know whether enough food is being provided; every effort should be made to ensure at least the standards fixed for an adequate diet.

Our present knowledge of what constitutes an adequate or optimum diet is based on an enormous amount of research work on human beings and laboratory animals carried out in many countries. It is now fairly easy to assess how much of each food factor is required for good nutrition and what it means in terms of common foodstuffs. Likewise, it is also easy to measure the extent to which diets in common use are adequate for health and to estimate the amounts of the different foodstuffs needed to bring the diet of a given population up to the requisite standard.

Proteins

Proteins are organic nitrogenous substances. They play an important role in ensuring the quality of a diet. In a sense, they may be stated to be one of the most important of the food factors; they supply building material for the body and make good the loss of tissue which is incurred during the complicated physiological processes which maintain life. They can also be used as a source of energy, but this would be somewhat wasteful.

Most foodstuffs contain protein, as can be seen from the Tables, but the amount they contain varies widely. Animal foods such as meat, fish and eggs are rich in protein; milk can also be considered as being rich in protein if due account is taken of the water that is present in it. Among the vegetable foods, the pulses and nuts are richest in protein, often exceeding the amounts present in animal foods. Soya bean is unique in this respect in that it contains over 40 per cent. protein. The common cereals such as rice, wheat, barley, etc., contain a fair proportion of protein, rice being one of the poorest and wheat the richest among cereals in this respect. The outer layers of the grain are richer in protein than the inner starchy kernel, and when wheat and rice are highly milled, there is thus some loss of protein as well as of other valuable factors, such as vitamins and mineral salts. Leafy and root vegetables and fruits do not contain much protein, but if they are abundantly present in a diet their contribution to total protein intake is by no means negligible.

Since proteins supply building material for the body, it is but natural to expect that growing children require, per unit of body-weight, more protein than adults. The new tissue which is being laid down is largely built up of elements drawn from protein. For the same reason, the protein needs of women during pregnancy and lactation are greater than at other times. The protein allowances suggested as a rough guide for practical nutrition work in India are given on Page 15. According to modern concepts, the protein allowance is adequate if it is of the order of one gramme per kilogramme of body-weight. Since Indian diets have generally a preponderance of proteins derived from vegetable sources and as these are usually of lower biological value than proteins of animal origin, a higher scale of allowance has been recommended by the Indian nutrition experts. Even with vegetable proteins alone, it will be possible to achieve the desired effect at a lower overall level through a proper combination of two or more of them. Deficiencies of amino-acids in one protein will be made good by an excess in another.

The total protein content of a diet can be estimated by means of Tables. But more important than the total protein content of a diet is the proportion of protein of high biological value which it includes. Proteins present in various foods differ in their *amino-acid* composition ; *amino-acids* are the bricks with which tissue protein is built and replaced, and the more closely the amino-acid make-up of a protein resembles that of the tissues, the greater is its value. The efficiency with which tissue protein can be replaced by food protein is termed "the biological value" of the food protein.

Another factor to be considered in assessing the value of the proteins of a foodstuff is their digestibility. In general, proteins derived from vegetable foods are of less value to the body than those derived from animal foods. It may be difficult to find a combination of vegetable proteins which can support growth and lay the foundations of healthy and vigorous manhood and womanhood as effectively as a mixture of vegetable and animal proteins. Some animal protein is essential during growth, pregnancy and lactation and it is desirable that in the growing periods it should form a good proportion of the total protein. This proportion may with advantage be *one-third*; preferably it should not be less than *one-fifth*. The best source of animal protein for growing children is milk derived from the cow or other species. It must be emphasised that skimmed milk is as rich in good protein as whole milk, and buttermilk of good quality is also a useful source.

Diets for growing children which do not contain a fair proportion of animal protein cannot be regarded as satisfactory. In devising "cheap balanced diets" in India, the inclusion of animal protein in adequate amount is the point which presents the greatest difficulty.

Data about the biological value of a number of proteins are given in Appendix I.

Fat

Like protein, fat is a necessary ingredient of a diet. The optimum or adequate quantities of fat that should be included in a well-balanced diet, however, are not known with any degree of certainty. It is probably desirable to have a daily intake of about 45 to 60 grammes (1½ to 2 ounces) of fat for an adult, of which about one-third is derived from animal sources. Surveys of diets consumed in different parts of India show that most diets are low in fat.

Fat is of value to the body in a number of ways, and a diet low in animal fat is often deficient in certain important vitamins of the fat-soluble group, particularly vitamin A. Vitamin A is present only in foods derived from animal origin; it is not present as such in the vegetable kingdom, where a precursor of it exists in carotene. Animal fats, such as butter or ghee, contain vitamin A but when they are adulterated with vegetable oils or with "vanaspati", the vitamin A content of such samples will get further diminished. There is one vegetable oil which is very rich in vitamin A activity, *viz.*, red palm oil, which is obtained from the fruit of the palm *Elaeis guineensis* grown in West Africa, Malaya and Burma. "Vanaspati", now getting popular in India as a cooking medium, is a hydrogenated vegetable oil, or often a mixture of vegetable oils hydrogenated to an extent calculated to give a semi-solid consistency at room temperature. It does not normally contain vitamins. Material sold under the caption "with added vitamins" should contain 700 I.U. vitamin A per ounce.

Apart from the oils and fats which are consumed as such and which are for the most part pure fats, the following foodstuffs are mong those rich in fat : oilseeds and nuts, soya bean and avocado pear. Cereals, pulses and vegetables contain fat only in extremely small amounts.

Fat is a concentrated source of energy; as fuel, it supplies per unit weight more than double the energy furnished by either protein or carbohydrate.

Carbohydrates

Carbohydrates are a class of substances which include glucose, cane sugar, milk sugar, starch, etc., They may be considered as the body's chief source of energy. Grain foods and root vegetables are largely composed of starch; cane sugar and glucose are hundred per cent. carbohydrates. The carbohydrates are a necessary constituent of a diet, but when, as is commonly in India, they are present in excessive amounts, the diet becomes ill-balanced. In working out diet schedules, the requirements of protein, fat, vitamins and minerals should first be attended to; subsequently carbohydrate-rich foods can be included in sufficient quantities to fulfil energy requirements.

Energy Requirements

This brings us to the question of energy requirements. It is well known that even when the body is at rest, it expends a certain amount of energy for essential functions such as respiration, circulation, secretion of urine, maintenance of body temperature, etc. The amount of energy thus expended when the body is at complete rest (both mentally and physically) is termed the Basal Metabolism. Race, age, sex, height, weight and state of nutrition of an individual are some of the factors which influence it. This basal metabolism for a given age, sex and size is used as the starting point for the calculation of the total energy requirement of individuals. Manual work, light or heavy, calls for an additional supply of energy. The

energy needed for both basal metabolism and for muscular activity will have to be supplied through food. In drawing up new diet schedules or in assessing the value of existing ones, the question is often posed whether greater importance should be attached to the question of sufficiency or quality or of both. Ensuring both sufficiency and quality is naturally obviously the most desirable. But where a choice has to be restricted to only one, the question of enough food should take precedence over quality and other considerations. Once this prime necessity of sufficiency is satisfied, attention can then be bestowed on whether the diet satisfies protein, mineral and vitamin requirements, etc. It is comparatively easy to decide the question whether enough food is being provided. If not so provided, it is legitimate to expect complaints about hunger. Unfortunately, experience has shown that human beings can adapt themselves, at a low level of vitality and with their powers impaired, to an insufficient ration, and scarcely realise that they are underfed. The nutrition worker in setting up standards of food requirements, ignores and justifiably too, the remarkable faculty of the body to adapt itself to mild degrees of starvation. He aims at not mere survival but virile manhood with all the faculties at a high level of working capacity.

Quantitative food requirements are usually estimated in terms of heat units—calories. A calorie is the unit of heat necessary to raise one kilogramme of water by one degree Centigrade. This physiological heat unit is different from the physical heat unit which is one-thousandth of the physiological calorie. Wherever calorie is mentioned in this Bulletin, it is only the physiological or the larger calorie that is referred to. The energy value of a foodstuff can be determined by employing a complicated Bomb Calorimeter or more easily calculated from the analysis of protein, fat and carbohydrate by multiplication with the usual physiological factors, namely 4·1, 9·3 and 4·1 respectively. But for practical purposes and ease of calculation, the decimal can be omitted and the whole integers, 4,9 and 4 adopted. This is the basis of calculation employed in arriving at the calorific value given out in the Tables.

An Expert Commission of the League of Nations has drawn up the following statement about energy requirements :—*

(*a*) An adult, male or female, living an ordinary everyday life in a temperate climate and not engaged in manual work is taken as the basis on which the needs of other age-groups are reckoned. An allowance of 2,400 calories net† per day is considered adequate to meet the requirements of such an individual.

(*b*) The following supplements for muscular activity should be added to the basic requirements in (*a*) :

Light work : up to 75 calories per hour of work.
Moderate work : up to 75–150 calories per hour of work.
Hard work : up to 150–300 calories per hour of work.
Very hard work : up to 300 calories and upwards per hour of work.

In view of the somewhat lower basal metabolism of Indians, there may be justifiable reasons for reducing "basic" calorie requirements below the League of Nations Standards. The actual calorie allowances for Indians as adopted by the Nutrition Advisory Committee of the Indian Research Fund Association have been set out in the Table on Page 15.

* The Problem of Nutrition, Volume II, Report on the 'Physiological Bases' of Nutrition, 1936.

† The term "net calories" refers to the amount of energy available from the calories actually assimilated.

It is usual to assess the food requirements of women and children in terms of those of the average man, various co-efficients being applied to the different age and sex groups. The following scale of co-efficients may be considered accurate enough for practical nutrition work in India:

	Co-efficient
Adult male	1·0
Adult female	0·9
Adolescents—12 to 21 years	1·0
Children—9 to 12 years	0·8
Children—7 to 9 years	0·7
Children—5 to 7 years	0·6
Children—3 to 5 years	0·5
Children—1 to 3 years	0·4

Calorie requirements of infants are dealt with on pages 23 and 24.

It must be emphasised that this scale is a somewhat arbitrary one. Physique, habits of life and other factors are so variable in different areas that no one scale of energy requirements and co-efficients could be entirely suitable for application throughout the country. A somewhat higher scale of calorie requirement would perhaps be appropriate for North India, particularly during the winter months. The requirements of a woman have been marked lower as compared to a man of corresponding age. During pregnancy and lactation, however, the needs of a woman may equal or even exceed those of a man because of the additional requirements needed to nourish a child in the womb or at breast. (*See* also page 15.)

With the help of the Tables in the Bulletin, the calorie content of diets can be worked out and compared with requirements as suggested; or conversely, diet schedules yielding approximately the right number of calories can be constructed. In dealing with a group of mixed age and sex composition, the number of "consumption units" in the group or its "adult man-value" is first calculated. To illustrate by a simple example: A family consisting of father, mother and 3 children aged 10, 8, and 6 respectively has an "adult man-value" on the above scale of 4·0 and its minimum daily calorie requirement would be 2,400 × 4 or 9,600 calories. If it is necessary to draw up a diet schedule for the family, food supplying roughly 9,600 calories should be included in the schedule. Suppose, analysis of the existing diet of the family indicates that total intake per day is below this level, attempts should be made to make good the deficiency.

Sound commonsense must be exercised in drawing up either new diet schedules, or in assessing the adequacy of existing ones. It is safer to err on the side of excess by 100 to 200 calories to allow for waste of all kinds, including the inevitable "leakage" of food which occurs in large institutions. Standards of calorie requirements are applicable only to reasonably large numbers and not to individuals. The relation between calorie requirements and such factors as work, activity and climate should be borne in mind.

It might be felt that there is little danger that children or adults housed in charitable institutions under careful and well-meaning management should be underfed. But experience has shown that this is not infrequently the case in India. Superintendents of children's institutions should take particular care that *enough* food is provided. The children themselves, often coming from homes in which they were half-starved, are not likely to complain of hunger in circumstances of *relative* abundance.

Mineral Salts.

There are indeed a large number of mineral elements that are present in the human body. Bones and teeth contain for the large part calcium, magnesium and phosphorus ; blood contains iron. It is estimated that an average man excretes

daily about 20 to 30 grammes of mineral salts, consisting mostly of chlorides, sulphates and phosphates of sodium, potassium, magnesium and calcium as well as ammonium salts derived from protein metabolism. This output must be made good by intake; in the case of the growing body, provision must be made for additional amounts necessary for storage as a constituent of the newly formed tissues. The mineral salts needed for the body are ingested through its diets. Of these, the salts of calcium, iron and phosphorus play a prominent role in nutrition. It is probable that these are the elements which are most likely to be insufficiently supplied by average human diets and hence in giving out the analyses of foodstuffs in the Tables, attention was directed to only these three mineral elements, viz., calcium, phosphorus and iron. There are a number of other elements needed by the body but as their importance in practical nutrition is somewhat less pronounced, they have been left out of consideration both in the text and in the Tables. There is, however, one element, iodine, which has been the subject of considerable study; the special problem of iodine deficiency in endemic zones of goitre is outside the scope of this Bulletin. In general, it may be assumed that if the diet is reasonably varied and well-balanced with respect to proteins, fats, carbohydrates and vitamins, it will supply enough of the mineral requirements.

Calcium

Calcium is found abundantly in milk (including skimmed milk and buttermilk), cheese and green leafy vegetables. Of the leafy vegetables, amaranth, fenugreek and drumstick leaves are particularly rich in calcium. Cereals which constitute a major portion of the average Indian diet contain fair amounts of this element. Rice is an exception in that it is extremely deficient in calcium and there is evidence that insufficiency of calcium is one of the most important defects of the rice-eater's diet. Children need relatively more calcium and other minerals than adults, to meet the needs of the growing bones. Expectant and nursing mothers require a large intake of calcium. A healthy breast-fed baby of three months contains a great deal of calcium in its bones, all of which has been drawn from its mother's blood and milk. If the mother's diet during this period were deficient in calcium, then the calcium present in her bones is drawn upon, and her health and probably that of the child will suffer. Since there is this enormous drain of calcium during pregnancy and lactation, adequate supplies are essential. A large intake of milk is, therefore, recommended during this period.

The usual text book figures for calcium requirements are 0·68 g. a day for adults and 1·0 g. for children. These figures allow a fifty per cent "margin of safety". These standards are not materially different from those fixed by the Nutrition Advisory Committee of the Indian Research Fund Association if allowance is made for the fact that a part of calcium in dietaries based on cereals is apt to be lost in the form of phytin. Indian diets, particularly diets based on milled rice, may often supply 0·2 g. or less of calcium daily. This intake is definitely too small and needs augmentation. The habit of chewing betel leaves smeared with slaked lime (calcium hydroxide), which is fairly common throughout India and particularly among the poorer classes, naturally increases the intake of calcium. Calcium ingested in this manner is utilised by the human body. It is hard to conceive of a more inexpensive means of ensuring some calcium intake. Possibly for the same reason expectant and nursing mothers in India, especially among the poorer groups of the population, resort to betel chewing about half a dozen times or more a day.

Phosphorus

Next in importance to calcium is phosphorus. The metabolism of calcium is closely related with that of phosphorus; most of the calcium that is deposited in the body either in the bones or teeth is as calcium phosphate. It is usually stated

that about one gramme or more of phosphorus daily should be supplied by the diet. Cereals and pulses are fairly rich in phosphorus. Rice, unlike in its calcium content, is fairly rich in phosphorus and thus conforms to the familiar characteristic of cereals in general. Considerable loss of this element occurs during the washing, an invariable practice with housewives, and cooking of rice. Nuts and oilseeds are as rich in this element as cereals and pulses. A large part of the phosphorus present in cereals, pulses and nuts is in combination as phytin; 40—60 per cent. of phytin phosphorus is not available to the human body. Milk contains more calcium than phosphorus, but its phophorus content is not inconsiderable. Phosphorus deficiency is rarely encountered in diet surveys in India; this is because the diets consumed by the poorer section of the population are overweighted with cereals. It may be stated confidently that ensuring adequate supplies of calcium is a more difficult task than ensuring an adequacy of phosphorus in Indian diets.

Iron

The amount of iron present in the body is small, but it has a very important function to perform. Haemoglobin, the red pigment of blood, a most important physiological substance which transports oxygen from the lungs to the tissues and carbon dioxide from tissues to lungs contains iron as an essential constituent of its molecule. Iron is essential for blood formation. When destruction and loss of blood corpuscles are taking place as in chronic malaria or hookworm infection, iron requirements are increased.

It is suggested that a well-balanced diet for a growing child or an adult should contain about 20 to 30 mgs. of iron. This figure gives a "margin of safety' and allows for the possibility that the iron content of foods in certain parts of India may be lower than that of the foods analysed in the Coonoor Laboratories. The iron in certain foods is less "available" -*i.e.*, less well assimilated than the iron in others. A fairly high percentage of the iron in cereals, pulses and meat, for example, is "available", but a lower percentage of the iron in vegetables. If, however, total iron intake from all foods present in the diet exceeds 20 to 30 mgs. per day, it is probable that sufficient iron will be assimilated.

In the treatment of certain forms of anaemia, iron medication is more effective than the consumption of a diet containing abundant iron-rich foods. For the prevention of anaemia, however, an iron-rich diet is valuable. Pregnant women are particularly prone to suffer from anaemia.

Other Elements

Besides calcium, phosphorus and iron, a large number of elements is needed for normal nutrition. They are : sodium, potassium, magnesium, manganese, cobalt, copper, zinc, chlorine, sulphur, etc. It is not necessary to go into the details of their requirements and their chief sources of supply through dietary means. It is reasonable to suppose that they will be supplied in adequate amounts if the requirements of the principal elements, calcium, phosphorus and iron, are satisfied through diet alone. It is only in the case of sodium and chlorine, a non-food dietary source of supply is resorted to in the form of common salt. The amount of sodium chloride which is ordinarily added to food as a condiment is so large that the amounts of sodium and chlorine present in foodstuffs have little practical significance. But when there is profuse perspiration, as often happens in many places in India, it is advantageous to replace this loss of sodium chloride through sweat either by taking a little extra salt with the drinking water or by adding a little extra salt to the food.

"Roughage" is generally understood to be the indigestible carbohydrates mostly cellulose and hemi-celluloses present in foods. It is also called "crude fibre" and is left unchanged by the digestive juices. Though contributing little to the

nutritive value of foods, the presence of roughage in the diet as a whole is favourable to the mechanics of digestion. It is stated to stimulate the contraction of the muscular walls of the digestive organs and to counteract the tendency to constipation. There is comparatively little roughage in cereals, root vegetables, nuts and oilseeds, and flesh foods; vegetables, particularly the leafy ones, fruits and condiments and spices are comparatively richer in this respect.

Vitamins

Vitamins are organic compounds present in minute amounts in fresh, natural foodstuffs which are essential for health and well-being. They are needed in such small amounts that they are considered to function as catalysts. They are commonly named by the letters of the alphabet; they are also referred to by the major functions they perform like, anti-xerophthalmic, anti-beriberi, anti-scorbutic, anti-rachitic, etc., vitamins. They are broadly divided into two groups based on their solubility, as water-soluble and fat-soluble. Vitamins A, D, E and K belong to the fat-soluble group, and B complex and C to the group of water-soluble vitamins. In the brief treatment of vitamins in the succeeding pages, the alphabetical order is followed and not the classification based on their solubility.

Vitamin A

Vitamin A is present in some animal fats like butter and ghee, in whole milk, curds, egg yolk, liver, fish, etc. Its richest known natural source is liver oil of certain fish, like cod, halibut, shark and saw-fish. Vitamin A is not present as such in the vegetable kingdom where a precursor of it exists in *carotene*. The pigment, carotene, was first isolated from carrots and hence this name. While vegetable foods do not contain vitamin A, they possess vitamin A activity because the carotene present in them is capable of fulfilling the physiological functions of vitamin A in the body. It is for this reason that carotene is often referred to as pro-vitamin A. Theoretically speaking, one molecule of β-carotene is capable of yielding two molecules of vitamin A. But in practice this does not happen. While vitamin A is easily assimilable, the physiological utilisation of carotene is dependent on a large number of factors. This does not mean that carotene is *not* assimilable; in fact, most of the vitamin A requirement of Indians is met by the consumption of a suitable vegetable diet. Leafy vegetables, such as spinach, amaranth leaves, coriander leaves, drumstick leaves and cabbage, and ripe fruits such as mangoes, papayya, tomato, oranges, etc., are rich in carotene. Root vegetables are poor in this respect, the only exception being carrots which are a good source of carotene.

It may be mentioned that the daily requirements of an adult are in the neighbourhood of 3,000—4,000 International Units of Vitamin A derived either from foods of animal or of vegetable origin. The requirements are greater in pregnancy and lactation and for growing children. Animal foods rich in Vitamin A are, however, many times more expensive; the easiest and cheapest way of ensuring a sufficiency of vitamin A is to increase the intake of green-leafy vegetables. Three to four ounces a day of the common leafy vegetables will furnish more than an adult's requirements of this vitamin. The needs of children can also be covered in the same way. But in the case of infants and young children, and sickly and malnourished children of all ages who cannot properly digest the fibrous leafy vegetables, it is advisable to supply vitamin A in the form of a daily dose of cod or shark liver oil or medicinal concentrates manufactured from such fish liver oils. Field investigations in India have shown that vitamin A deficiency is the single factor responsible for a large number of nutritional deficiency diseases and that the intake of cod or shark liver oil increases nutritive value of the average Indian diet.

It is relevant at this stage to say a few words about the shark liver oil industry in India. Until recently, the only sources of vitamin A for treatment of deficiency cases were the Norweigian cod liver oil and concentrates manufactured from halibut liver oil. But during the recent war, the imports of cod liver oil were completely stopped. The cutting off of such supplies of a valuable commodity would have had disastrous effects on the general health of India, had it not been for the fact that alternative sources were easily available. The shark and saw-fish that are found in Indian coastal waters yield a liver oil which is often more potent in vitamin A than the imported cod liver oil. It is somewhat strange that the shark and saw-fish are found extensively in the coastal waters of the Arabian Sea and Indian Ocean, extending from Karachi down to Cape Comorin while they are somewhat rare along the eastern coast.

A flourishing industry for the manufacture of cod liver oil substitutes has now been developed In most hospitals and boarding schools in India, a cod liver oil substitute based on shark and saw-fish liver oil is being extensively administered. Vitamin A has now been synthesized and the synthetic product has replaced the vitamin obtained from natural sources in therapy and in the fortification of foods.

The vitamin A activity of any given foodstuff is variable, depending on a number of factors. That of milk and butter, for example, fluctuates according to the diet of the animal from which they are derived. It has been observed in Europe that "summer" milk, obtained from cows fed on succulent green grass rich in carotene, contains more vitamin A than "winter" milk. Such a difference is not likely to exist in a tropical country like India. The vitamin A content of different samples of butter may vary from 600 to 6,000 International Units or more per 100 grammes. In the manufacture of ghee from butter by the usual methods adopted in Indian homes, some 25 per cent. of the vitamin A originally present may be destroyed. Prolonged heating of ghee in an open pan causes serious destruction of vitamin A. Cow ghee is richer in vitamin A than buffalo ghee. While buffalo ghee is practically devoid of carotene, cow ghee contains fair amounts of carotene which adds to its vitamin A activity. This enhancement of vitamin A activity in cow ghee through carotene may be to the tune of thirty per cent. Genuine cow ghee may contain about 20 to 25 International Units of Vitamin A activity per gramme while that of buffalo ghee 8 to 10 I.U./g.

Vitamin A is somewhat more stable than carotene. Light, particularly the ultraviolet rays, has a destructive influence on carotene. A good rough indication of the carotene content of leafy vegetables is their greenness. Green and fresh vegetables contain invariably more carotene than stale ones. Ordinary cooking of vegetables causes only egligible losses in carotene content. It will be seen in the Tables that for a number of foods, individual values for vitamin A and carotene are not given but a range. In devising diets, a figure lying midway between the two extremes may be used. In the absence of information about the vitamin A activity of a vegetable food, it may not be wrong to assume that most green leafy vegetables are richly endowed in this respect, while other vegetables, cereals, pulses, etc. are less important sources of carotene. Most ripe fruits are fairly rich in carotene.

Vitamin A deficiency is very common in India, perhaps more in the South than in the North, and care must be taken to ensure an adequate supply of this vitamin.

The B Vitamins

A whole group of vitamins is included under this head. Vitamin B_1, or "thiamine", as it is more popularly called now, has often been referred to as the "anti-beriberi" or "anti-neuritic" vitamin. It is an important member of this group and the first of the vitamins to be discovered. Its lack or deficiency in the food gives rise to a disease called beriberi, wherein there is partial or complete paralysis of the limbs, due to degeneration of the nerves, often accompanied by dropsy and by weakness of heart muscle leading to heart failure. Thiamine is also concerned in the proper utilisation of carbohydrates ; in the absence of adequate amounts of thiamine, full utilisation of sugars and starches for energy needs is retarded. Yeast and the outer layers of cereals removed on milling, like rice and wheat bran, have a high thiamine content. The richest sources of thiamine among ordinary foods are unmilled cereals, pulses and nuts, particularly groundnut. Meat, fish, eggs, vegetables, fruits and milk are in general poor in thiamine. A diet largely composed of raw milled rice contains insufficient thiamine and may cause beriberi, which is a common disease in certain parts of India, as in the Northern Circars districts of the Andhra State. Parboiled rice, even when highly milled, usually contains enough thiamine to prevent beriberi. A rice grain consists of three principal parts : germ, pericarp or outer layer and endosperm or inner layer. During milling of the raw rice, the thiamine mostly present in the germ and outer layer goes out along with the bran and the woody husk, while the highly polished white rice, pleasing both to the eye and to the palate, contains negligible amounts of thiamine. Whereas, during parboiling, a process in which paddy is subjected to steaming under slight pressure till the woody husk splits, thiamine and other nutritious elements present in the outer layer and germ diffuse through the entire mass of the grain, so much so the parboiled grain, even though milled like raw rice, still contains enough thiamine to prevent beriberi. It is for this reason, parboiled milled rice is superior to raw milled rice.

The washing and cooking of rice cause a considerable loss of thiamine, nicotinic acid, phosphorus and other important dietary constituents. This loss is greater in raw than in parboiled rice, for reasons mentioned above. Rice which is mouldy and weevil-infested is likely to be subjected to greater washing. Such poor quality rice is often consumed by the very poor whose diet contains only small quantities of foods other than rice, and who are in the greatest need of the elements lost in washing. It is the first washing which causes most of the loss, so that there is not much to be gained by reducing the number of washings. The cooking of rice may cause further losses if too much water is used and the excess cooking water thrown away.

The thiamine requirements of an individual are dependent on a number of factors chiefly the composition of the diet. The amounts of carbohydrate and fat consumed are of importance; the more the carbohydrate, the greater is the need of this vitamin, while fat has what is termed a "vitamin B_1 sparing" action. Requirements are increased by heavy work or strenuous exercise, and also during pregnancy and lactation. In a very rough way, the thiamine needs of school children and adults living on ordinary diets in normal circumstances may be estimated at about 330 International Units or one milligramme a day. It is not difficult to ensure that a diet contains enough of this vitamin. Diets based on whole wheat, any of the millets, raw home-pounded rice or parboiled rice (home-pounded or machine milled) usually supply thiamine in sufficient amounts. The greatest danger of thiamine deficiency arises when highly milled raw rice is consumed as the main ingredient in a diet containing other foods such as pulses in negligible amounts. But even when this kind of rice is eaten, there is not much danger of beriberi if 3 ozs. or thereabouts of pulses are taken daily. The smaller the supply of non-cereal foods, the more important it becomes to avoid a preponderance of milled raw rice in the diets. An easy and effective means of preventing thiamine deficiency

is to have recourse either to parboiled rice or undermilled raw rice or by a partial replacement of the highly milled raw rice by any of the millets to the extent of about 4 ozs.

There are several other members of the B group of vitamins. They are sometimes referred to as the "B_2 Complex". Recent investigations have shown that some of them are of great importance in human nutrition. They include nicotinic acid (also called niacin), riboflavin, pantothenic acid, pyridoxin, folic acid and vitamin B_{12}. Soreness of the angles of the mouth and the tongue, ocular lesions, like corneal opacities, corneal ulcers and photophobia, and dermatitis are caused by a lack or deficiency of riboflavin in the diet. Pellagra and nutritional diarrhoeas are due to nicotinic acid deficiency. "Burning feet" associated with ariboflavinosis has been reported to have been cured by administration of calcium pantothenate. There are besides other factors which are not at present considered necessary in human nutrition. Figures for nicotinic acid and riboflavin for a number of foodstuffs are included in the Table. In general, whole cereals, pulses and nuts are fairly good sources of most members of this group. Milled cereals, and in particular raw milled rice, are poorly endowed and the same is true of vegetables and fruits, in general. Yeast, milk-products (including skimmed milk, buttermilk, curds and cheese), lean-meat, liver and eggs are among the best sources of this group of vitamins. There is good evidence that poor Indian diets, which contain little milk or meat, are often very deficient in the B_2 group of vitamins.

"Soreness" of the angles of the mouth and of the tongue—"angular stomatitis" —is known to be caused by a deficiency of vitamins belonging to the B_2 complex. It is often seen in those whose diet consists largely of milled rice. Rapid cure follows the daily consumption of half to one ounce of dried yeast, or half to one pint of milk or 2 to 3 eggs. An all-round improvement of the diet in the direction illustrated by the diagram facing page 18 is also very effective in treatment.

Vitamin C

Vitamin C or ascorbic acid is the vitamin that prevents scurvy. It is usually found in fresh fruits and vegetables, particularly the green leafy varieties. Of all the vitamins, vitamin C is the one vitamin that is most easily susceptible to destruction by atmospheric oxidation. One of its characteristic properties is its intense reducing action and hence the tendency to rapidly oxidise in air. It is for this reason that when vegetables get dry and stale, most of the vitamin C originally present is destroyed.

Fresh meat and milk contain a little vitamin C. Pulses and cereal grains in the dry state do not normally contain vitamin C. When, however, they are allowed to sprout or germinate, the vitamin is formed in the grain and in the growing sprouts. About 85 per cent. of the vitamin is present in the grain and only 15 per cent in the shoot. Sprouting is a simple process wherein the grains are, after a preliminary soaking in water for about 24 hours, spread out on damp earth or damp blanket and covered over with a moist cloth. In 2 or 3 days, the grains will have germinated with half to three quarters of an inch of sprout. The germinated grain should be consumed either raw or after cooking for a minimum period. Usually during prolonged drought and consequent famine, scurvy is about the first deficiency disease to make its appearance. It would be difficult to provide adequate amounts of fruits and fresh vegetables in such areas. Sprouted grains may be used then as a cheap and easily available source of vitamin C. The one commonly employed is sprouted Bengal gram (*Cicer arietinum*). Its efficacy in preventing scurvy has been more than once demonstrated in famine areas in India. Sprouted Bengal gram is by no means the best source of vitamin C among sprouted grains; sprouted mung (*Phaseolus radiatus*) or green gram is about three times more potent in vitamin C than sprouted Bengal gram.

There is one very cheap and common fruit, namely amla or nellikai (*Phyllanthus emblica, Linn.*), which is very rich in vitamin C—which, indeed is one of the richest natural sources of the vitamin. Amla grows abundantly in all Indian forests, and is obtainable in almost unlimited quantities from January to April. The fresh juice contains nearly twenty times as much vitamin C as orange juice, and a single fruit is equivalent in vitamin C content to one or two oranges.

The heating or drying of fresh fruits or vegetables usually leads to the destruction of most or all of the vitamin C originally present. Amla is exceptional among fruits because of its very high initial vitamin C content, because it contains substances which partially protect the vitamin from destruction on heating and drying, and because its juice is very strongly acid. Acidity has a protective action on vitamin C. Hence it is possible to have amla preparations potent in vitamin C.

Scurvy is the drastic consequence of prolonged vitamin C deficiency. Nowadays the extreme manifestations of such total deficiency are rarely encountered, but there are many "prescorbutic" or "sub-clinical" conditions for which a partial deficiency of vitamin C is held responsible. Bleeding gums and mucous membranes, petechial haemorrhages, retarded wound-healing, etc., are manifestations of such partial deficiency.

A well-balanced diet for school children and adult should contain some 30-50 mgs. of vitamin C per day. Vitamin C is sensitive to heat, and loss occurs on cooking, particularly if cooking is prolonged. Nevertheless, the inclusion of a few ounces of fresh fruit and leafy and other vegetables in a diet will ensure that its vitamin C content is satisfactory. In the case of infants fed on boiled fresh milk or reconstituted dried milk, special attention to vitamin C requirements is necessary. These can be met by giving fruit juice in small quantities.

Vitamin D

Vitamin D, the vitamin which prevents rickets and osteomalacia, is found in liver and liver oils, egg yolk, and in milk and milk fat *(e.g.*, ghee) obtained from animals fed on green pastures and exposed to sunlight. Fish liver oil is its richest natural source. Rickets and osteomalacia are both serious diseases, the former affecting children and the latter adults, mainly women. They cause deformities of bones, often gross deformities, because the deposition of lime salts in the bones a process in which vitamin D plays an important part, does not proceed normally in absence of vitamin D.

Vitamin D is also formed in the skin by the action of sunlight which transforms a substance normally present there —a 'precursor' of vitamin D —into vitamin D itself. Hence rickets is particularly apt to occur in infants living in dark houses while osteomalacia is often found in the North among women who observe *purdah*. Probably minor degrees of rickets are more common in infants and young children throughout India than is generally believed. Often the cheapest way of obtaining this vitamin is by exposure of the body to sunlight. Medicinal preparations of vitamin D cost money. The sun is free. There is a close connection between vitamin D and calcium and phosphorus metabolism. When little vitamin D is obtained, and at the same time insufficient calcium is present in the diet, the danger of rickets and osteomalacia is increased. This is an additional reason why attention must be given to calcium intake. Osteomalacia, manifesting itself in the first instance by pain in the bones, usually starts during pregnancy, when demands for calcium are raised because of the needs of the growing foetus in the womb. After the child is born the disease may regress for a time, but it tends to recur in more severe form in succeeding pregnancies. Ultimately the bones of the unfortunate victim may become so bent that she is unable to stand upright, and distortion of the pelvis

may make it impossible for child birth to take place normally. A good supply of this vitamin during pregnancy benefits the mother and helps to ensure the satisfactory future development of the child.

Shark and saw-fish liver oils usually contain a little more vitamin D than cod liver oil. If, however, groundnut oil, which contains no vitamin D, is added to the former to produce a preparation equivalent to cod liver oil in vitamin A content, the amount of vitamin D in the mixture may be below that normally present in cod liver oil. It is, however, easy to bring substitutes up to cod liver oil standard as regards vitamin D by the addition of pure vitamin D ("calciferol") in suitable quantities. Calciferol and preparations containing calciferol can be manufactured, and because of their high anti-rachitic potency, are of great value in the treatment of rickets and osteomalacia. Calciferol is synthetic vitamin D and differs somewhat in chemical structure and composition from natural vitamin D obtained from foodstuffs or by the exposure of the skin to sunlight. In human nutrition, both (synthetic and natural vitamin D) exert a like action. About 400 to 800 International Units are stated to be the requirements of a child. The requirements for adults may be less, but not known with any degree of certainty. One gramme of the vitamin contains 40,000,000 International Units; it is easily apparant what small quantities are needed.

There remain besides vitamins E and K many less well-known vitamins. They are not discussed here as they are not considered sufficiently important for practical nutrition work in India. The role of some newly discovered factors in human nutrition is still a moot problem.

The Effect of Cooking on Nutritive Value

Nearly all foodstuffs, with the exception of fruits and some leafy vegetables used either as salads or in chutneys, are consumed in the cooked state. The assessment of the nutritive value of any foodstuff should, strictly speaking, be made on the processed material, a state in which it is consumed and not in its raw state. But this presents insuperable difficulties as culinary practice varies from province to province, district to district and even house to house. Further, knowledge on the subject is rather meagre, and hence only broad details are given.

Cooking involves one of the following processes : Wet methods of treatment like boiling and steaming, and dry methods of treatment like frying, roasting and baking. The wet methods of cooking lead to greater losses than the dry methods. The effect of heating and cooking on the nutritive value of foodstuffs, is on the whole, less pronounced than is generally believed.

Ordinary cooking causes little loss of protein, fat and carbohydrates in cereals, pulses and meat ; in vegetables, however, there may be some protein lost on boiling in water, particularly when salt is used in cooking and the cooking liquor rejected. There is considerable loss of mineral salts in this process due to leaching ; sodium, potassium and chlorine ions, somewhat relatively less important in practical nutrition, show the greatest loss. It is, however, advisable to use the minimum amount of water and to utilise the cooking liquor in either soups or gravies. Root vegetables do not suffer much loss by either the wet or dry methods of cooking. The skin of most root vegetables is impermeable and hence it is preferable to boil them with their skins. It is, however, a more common practice with the housewife to peel and cut them before boiling. The smaller the piece the greater will be the surface area exposed and consequently losses due to leaching will be greater. But in soup making, this will not make any difference. Steaming of vegetables is even preferable as practically no losses due to leaching occur.

Even during preliminary treatment of washing, prior to cooking, a certain amount of minerals is lost. It is a common practice for the housewife to wash rice three or four times with large amounts of water before cooking. Considerable amounts of minerals pass into the water, the proportion removed being greater than that removed by the subsequent cooking. Rice of poor commercial quality naturally tends to require more washing than rice of good quality, and the loss of mineral matter and B vitamins from such rice may be great. Contrary to the general belief, rice "conjee" (surplus liquor strained away after cooking rice) is not rich in elements contained in the original rice, and should not be regarded as being of high nutritive value.

The vitamins, particularly the members of the water-soluble group, show greater loss during cooking than the mineral salts. Vitamin A, carotene (pro-vitamin A) and vitamin B_1 survive for the most part during cooking by ordinary methods. But the addition of soda (sodium bicarbonate) to cooking water either for the preservation of colour or to facilitate cooking leads to far greater losses. Conversely, a substance like tamarind with high acidity, has, when added to cooking water, a preservative effective on the vitamins. It is vitamin C that suffers maximum loss during cooking. Even here, the loss on cooking is smaller than the loss due to leaching during boiling in water. A similar loss in vitamin C takes place during the interval between cooking and actual consumption. It is very rarely a dish is consumed immediately after cooking. It is for this reason it is desirable to include some raw fruit or vegetable in the diet.

Frying does not lead to much change in the nutritive value of foodstuffs, whether they are fried in deep or shallow fat. If ghee or butter is used for frying, there is destruction of the vitamin A originally present in the cooking medium. The boiling of milk leads to destruction of a major portion of its vitamin C and somewhat less of its vitamin B_1, while vitamin A, carotene, vitamin D, riboflavin and nicotinic acid are not seriously affected. Eggs suffer little or no loss of vitamins A, B_1 and D, riboflavin and nicotinic acid during cooking.

Thus far, the deleterious effects of cooking have been considered. Cooking is not without some beneficial effects. Cooking improves palatability and digestibility of foodstuffs in general. The biological value of proteins is oftentimes enhanced by cooking, partly through making the proteins more easily assimilable and partly through destruction of such factors as trypsin inhibitors which impede the proper digestion and utilisation of proteins. Trypsin inhibitors are known to be present in some pulses and legumes, principally soya bean. Biotin, one of the vitamins of the B group, is present in fair amounts in egg yolk; but, its usefulness is prevented by avidin, present in egg white, which possesses considerable biotin-inactivating properties. Cooking destroys completely this biotin-destroying activity of avidin. Finally, cooking kills disease-bearing germs present in foodstuffs.

Dietary Allowances

It will be appropriate now to consider the daily dietary allowances in terms of essential nutrients. Table I given below was prepared in November, 1944 by the Nutrition Advisory Committee of the Indian Research Fund Association, now Indian Council of Medical Research. The figures are based on the knowledge obtained by the work done in India and abroad. There are quite a few gaps in our knowledge which, it is hoped, will be filled in the near future. The Table and notes are quoted in full from the Nutrition Advisory Committee Report.

TABLE I.—*Recommended Daily Allowances of calories and some essential nutrients*

		Net calories	Proteins	Fats	Ca. (Calcium)	Fe. (Iron)	Vit. A I. U.	Thiamin (Vit. B_1)	Vit. B_2 complex	Ascorbic acid	Vit. D.
			g.		g.	mg.		mg.		mg.	I. U
Man (55Kg. or 120 lbs.)	Light or sedentary work.	2400	82	See Note (4) following the table	1·0	20 to 30	3000 to 4000	1·0 to 2·0	See Footnote (10) following the table	50	400 to 800
	Moderate work .	3000	82								
	Very hard work	3600	82								
Woman (45 Kg. or 100 lbs.).	Light or sedentary work.	2100	67								
	Moderate work .	2500	67								
	Very hard work .	3000	67								
	Pregnancy .	2100	101		1·5						
	Lactation .	2700	112		2·0						
Children .	Under 1 year .	100/Kg.	3·5/Kg.								
	1 to 3 years .	900	3·5/Kg.								
	3 to 5 years .	1200	3·5/Kg.								
	5 to 7 years .	1400	3·0/Kg.		1·0	10	3000	0·5		30	400
	7 to 9 years .	1700			to	to	to	to		to	to
	9 to 12 years .	2000	2·5/Kg.		1·5	30		1·0		50	800
Adolescents	12 to 15 years .	2400								and	
	15 to 21 years .	2400	2·0/Kg.							over.	

N.B.—The estimates of the protein requirements of children , and adolescents are given in terms of grammes per kilogram because adequate data about average weight in the various age groups were not available to the Sub-Committee.

NOTES

1. The term 'net calories' means the energy available from the food actually assimilated.

2. Additional calories for moderate and heavy work have been provided for, in accordance with the recommendations of the Technical Commission on Nutrition of the League of Nations Health Organization.

3. Proteins of animal origin are generally superior in biological value to vegetable proteins. It is, therefore, desirable that some animal proteins should be included in the diet. Various estimates have been made of the desirable proportion of animal to vegetable proteins, *e.g.*, 1 : 1, 0 ·5 : 1 or less. These are, however, not based on a fully satisfactory scientific foundation. Some animal protein should, however, be included in the diet. The diet given in Table II contains about 29 gms. of animal proteins equivalent to about 29 per cent. of the total protein.

4. Fats must be included in a balanced diet but there is no exact knowledge at present available of the quantity required; hence no figures have been included in the Table. Fats possess the advantage of yielding more than twice the energy obtained from carbohydrates or proteins. It is the general experience of nutrition workers that, even in a temperate climate, there is a tendency towards a higher consumption of fats in winter than in summer. A liberal consumption of fats can be advocated on the ground that some of them act as vehicles for fat-soluble vitamins and thus may provide these nutrients to the body in appreciable quantities.

5. Figures for carbohydrate requirements are not given in the Table. If the constituents listed in the Table are obtained from a variety of natural foodstuffs adequate amounts of carbohydrate will be obtained.

6. Equivalents of 1 milligramme of various vitamins in International Units are shown below :—

1·0	milligramme	B carotene	= 1,666 I.U. Vitamin A.
1·0	,,	Vitamin A	= 3,300 I. U.
1·0	,,	Thiamin hydrochloride	= 333 I.U. Vitamin B_1.
1·0	,,	Ascorbic acid	= 20 I.U. Vitamin C.
1·0	,,	Calciferol	= 40,000 I.U. Vitamin D.

7. Vitamin A requirements can be met by pre-formed vitamin from animal foods, and by pro-vitamin A (carotene) present in some foods of plant origin. When the latter forms the bulk of the source of the vitamin, a higher level of intake is necessary than when preformed vitamin A is the source of supply. In Indian diets, pro-vitamin A is the main source of vitamin A activity. The figure in the Table is intended to cover vitamin A requirements in terms of Indian food habits.

8. Vitamin D is undoubtedly necessary for older children although no definite figure can be given at present. Exposure to the ultraviolet component of sunlight leads to the formation of vitamin D in the skin and thus may supply a part of vitamin D requirement. No data are available about the contribution to vitamin D requirements from this source in tropical and subtropical countries.

9. The information about the availability of iron from different foodstuffs is incomplete. Hence a figure for total iron intake higher than the usually accepted standard is included in the Table.

10. The human requirements of riboflavin, nicotinic acid and other members of vitamin B_2 complex have not yet been placed on a fully satisfactory basis and hence are not included in the Table. These vitamins are, however, essential for human nutrition. A few quantitative estimates of requirements have been made, *e.g.*, from 2·2 to 3·3 mgs. of riboflavin and 15 to 23 mgs. of nicotinic acid for adult men. Future research in India and elsewhere should be directed to placing this problem on a firm scientific basis.

11. There are several other minerals which are essential in nutrition, *e.g.*, iodine, magnesium, copper, manganese, etc. In general, if a diet is well balanced and is adequate in respect of other better known essential nutrients it can be assumed that it will supply such minerals in adequate quantities.

12. Allowance has been made for the unavailability of a certain proportion of most of the constituents in mixtures of foodstuffs, as also for the possibility of destruction through methods of preparation.

Balanced Diet

The information given in the Table can be interpreted in terms of common foodstuffs, and has been done below.

The Table and the notes which follow are also quoted from the report of the Nutrition Advisory Committee already referred to.

Table II.—*Composition of a Balanced Diet*

(*Adequate for the maintenance of good health*)

	Oz.
Cereals	14
Pulses	3
Green leafy vegetables	4
Root vegetables	3
Other vegetables	3
Fruits	3
Milk	10
Sugar and jaggery	2
Vegetable oil, ghee, etc.	2
Fish and meat	3
Eggs	1 egg.

Cereals.—The type of the cereal forming the staple article of diet will vary according to locality. This variation will, however, cause little appreciable disturbance in the nutritive value of the diet, for the non-cereal portion of the diet as advocated provides most of the essential nutrients in requisite amounts.

Fats and oils.—The quantity of total fat in a diet made up according to the Table will be about 90 gms. Under the heading fats in the Table is included the fat or oil used for cooking and flavouring the food. As much of this as possibel could be butter or ghee, if means permit.

Fish, meat and eggs.—These foodstuffs are excellent sources of proteins of high biological value and good sources of vitamins of the B_2 group. Egg is rich in vitamin A and is the only natural foodstuff, besides milk fat, supplying appreciable amounts of vitamin D.

Sugar and jaggery.—Sugar and related products are used mainly as sweetening agents. They thus increase the palatability of foods and also contribute to the energy value of the diet. Jaggery also adds to the mineral constituents of the diet.

Condiments and spices.—These accessory foodstuffs are not included in the diet Table. Most of them are used for flavouring foods. Some of them contribute in appreciable amounts essential nutrients even in the small quantities in which they are used. Their value in improving the palatability of the diet is to be particularly stressed, and as such their use in moderate quantities is desirable.

Milk and milk-products.—In Table II the requirement of an adult has been placed at 10 ounces per day. We are not satisfied with this low figure, it may, however, be taken as a practicable objective to be reached within a short period. When conditions improve, the figure for milk requirement will have to be increased, and brought in line with the commonly accepted standard of 20 ozs. per adult per day. It appears that in certain parts of the country such a figure has already been reached. The Committee feels that in future care should be taken to see that the level of intake in such areas is not lowered. During infancy and childhood the requirements of protective foodstuffs, particularly milk, are greater than those advocated for adults (Table II), *e.g.*, nutrition workers recommend a daily allowance of about 40 ounces per child of 1 to 6 years. It is necessary to stress, therefore, that in considering the distribution of the available milk supply the needs of infants, growing children and pregnant and nursing women should receive a high priority.

Requirements of pregnant and nursing women.—During pregnancy and lactation, a woman needs more protein and minerals. The extra protein can be obtained by substitution of a part of the cereal portion of the diet by more milk, fish, meat and eggs, particularly milk, and in case of vegetarians by a further additional provision of milk. This would also ensure the necessary additional supply of minerals.

Investigations of Diets and Improvement in Practice

The information given in the last two sections should enable one to remedy the defects in the diets which may have come to light as the result of a survey. Such surveys are usually carried out by house to house visits in which information about food consumption, the number of inmates with their age and sex, monthly income of the family, etc., is collected. From these data one can derive the actual consumption of the foodstuffs and calculate the intake of nutrients by a reference to the Tables. One can then proceed to suggest improvements in the diet. Attempts in this direction are likely to be limited by the income of the family, and it would be wise to effect a compromise by temporarily sacrificing the ideal to the necessity of making the improvement economically possible. Fortunately in India a wide choice of cheap foodstuffs is available, a judicious use of which should greatly reduce the conditions of malnutrition.

A concrete example will illustrate the methods to be followed in improving diets and drawing up satisfactory diet schedules. Let us suppose that the daily diet

schedule of an institution, or of any group of people, works out as follows in amounts per consumption unit per day:—

TABLE III.—*Composition of an Ill-balanced Diet*

	Ozs.		
Milled rice	15·0	Protein	38 gms.
Milk	1·0	Fat	19 gms.
Pulses (dhal arhar)	1·0	Carbohydrate	357 gms.
Brinjal	1·0	Calories	1,750
Ladies finger	0·50	Calcium	0·16 gm.
Amaranth	0·25	Phosphorus	0·60 gm.
Gingelly oil	0·50	Iron	9·0 mg.
		Vitamin A (International Units)	500
		Vitamin B_1	0·5 mg.
		Vitamin C	15·0 mg.

This diet is shown diagrammatically in the figure (the "Insufficient and Ill-balanced" diet).

By reference to the Tables which follow later, the composition of the ill-balanced diet can be worked out. Its chemical composition is given in columns 3 and 4 of Table III.

It is at once apparent that this diet is insufficient in quantity and that it fails to supply the necessary requirements of any of the food factors enumerated. Such a diet, it may be remarked, is typical of diets consumed by millions in India.

An improvement is possible in this diet in almost every category of foodstuff. If means did allow, the foodstuffs included in Table II in quantities given there to make a well-balanced diet would be the best substitute. But it will be realised that items like milk, fruits and flesh foods, are expensive and beyond the means of many. In these circumstances it would be better if the question of cost was borne in mind while attempting any improvement in the diet. From the institutional point of view, therefore, the introduction of a second cereal, *e.g.*, millets, increase in pulse and vegetables, particularly green leafy vegetables with proportionately small increase in milk and if no religious objections exist, the introduction of cheap flesh foods two to three times a week can serve the purpose of enhancing the nutritive value of the diet without adding a heavy burden of cost. The improved diet is given in Table IV, with the essential nutrients that can be derived from it in columns three and four and also illustrated in the diagram.

TABLE IV.—*Composition of an Improved Diet*

	Ozs.		
Rice	9	Protein	73 gms.
Millet, cumbu	5	Fat	73 gms.
Pulse	3	Carbohydrate	445 gms.
Non-leafy vegetables	6	Calories	2,795
Green leafy vegetables	8	Calcium	1·5 gms.
Milk	4	Phosphorus	1·4 gms.
Fat and oil	2	Iron	60 mg.
Sugar or jaggery	2	Vitamin A (International Units)	5,000
		Vitamin B_1 (Milligrammes)	1·5
		Vitamin C do.	100

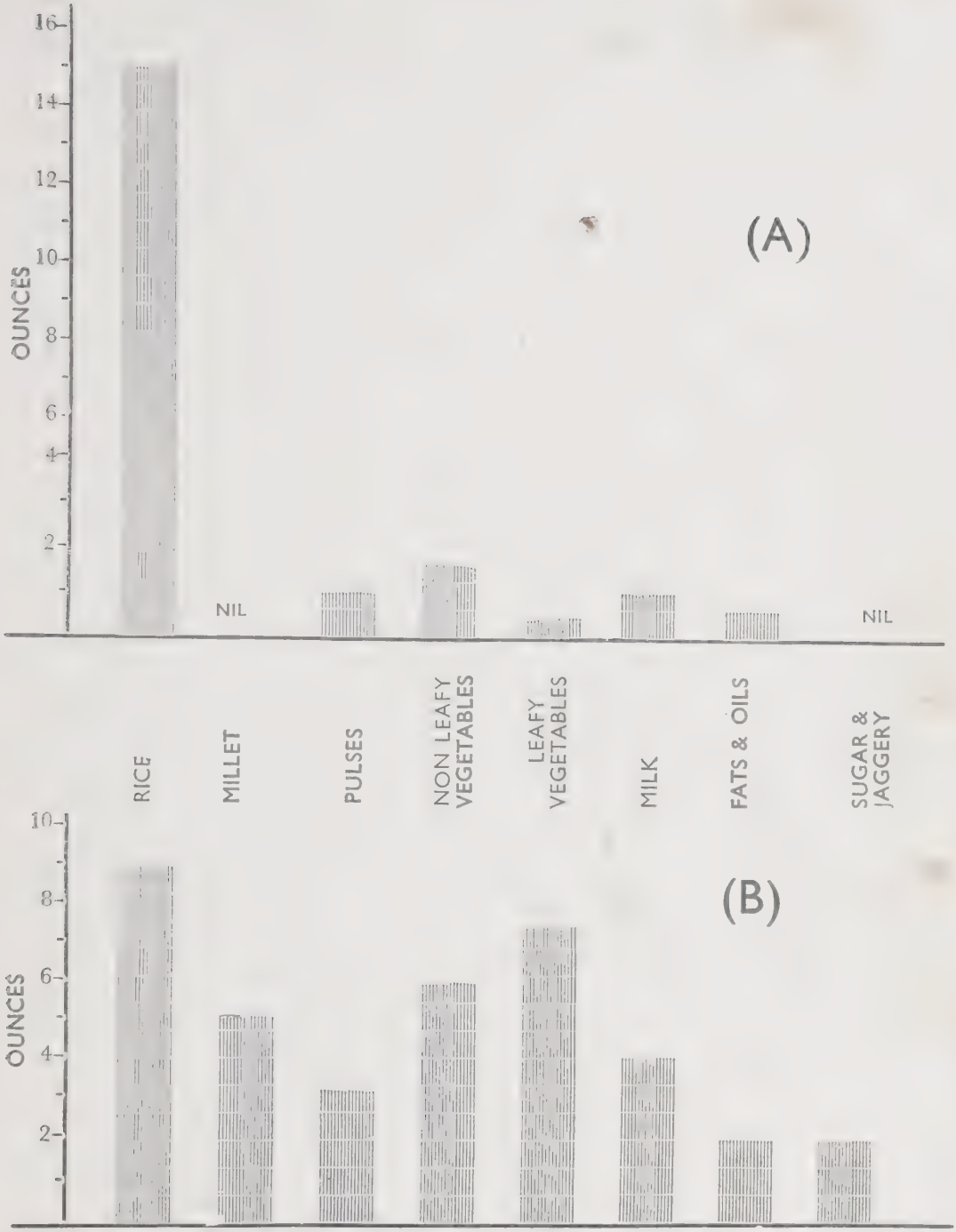

Fig. 1 Illustrating (A) insufficient and ill-balanced diet and (B) improved diet. For details see Tables III and IV.

It is understood that there will be several objections against this improved diet such as that the quantity of milk is too small, proportion of cereal still large, that mention of ghee, butter fats and oils is not made, etc. In making any comments on this diet, however, one must remember the limitations under which one has to work.

Well-balanced diets are in general more expensive than deficient ones. For example, the "Insufficient and Ill-balanced" diet shown in the diagram, which is largely composed of rice and contains very little milk, vegetables, or fruit, costs about Rs. 3 per adult per month; the "well-balanced" diet richer in milk and other foods, Rs. 15 to 18. The same diets would have cost Rs. 2-8-0 and Rs. 5 to 6 in pre-war days. It is at this point, therefore, the nutrition worker encounters the main difficulty. Those who suffer from under- and malnutrition usually cannot afford to purchase a satisfactory diet. Many residential institutions for children in India, for example, are very short of money, and have often to feed their boarders on Rs. 5 to 6 per head per month or a good deal less. Now it is difficult, in fact impossible, to supply a really satisfactory diet for such sums.

But even when poverty prevents the purchase of a diet which satisfies modern standards of nutrition, it is often possible to make effective improvements with little increase in cost. It is desirable that children should consume upwards of 8 ozs. of milk a day—8 ozs. being an amount below that recommended as "optimum" by nutrition workers elsewhere. If available funds do not admit the addition of this quantity of whole milk, buttermilk or skimmed milk reconstituted from skimmed milkpowder which are considerably cheaper, may be supplied. Even a little milk is better than none. Careful experiments have shown that the giving of 8 ozs. of skimmed milk daily to children fed on an average "ill-balanced" Indian diet results in an acceleration of growth and a great improvement in health and well-being. Such an addition is not very costly and is now being supplied in a considerable number of children's homes in India to the great benefit of the children.

Diets in children's homes and among the general population are often low in fat. Addition of extra vegetable oil (at the expense of a quantity of cereal supplying an equivalent number of calories), does not greatly increase expenditure. Pure ghee or butter is, of course, preferable to vegetable fat, but very much dearer.

Other points to which attention should be given include the following: If the cereal consumed is milled rice, an improvement in the nutritive value of the diet (and in the health of those consuming it) can be brought about by wholly or partially substituting undermilled rice, whole wheat, or one of the millets, particularly ragi. If milled rice remains the basis of the diet, it should be realised that the milled rice eater needs more "protective" foods (milk, green vegetables, fruits, etc.) than the consumer of whole wheat or ragi. When the diet is almost wholly composed of rice—when people are so poor that they cannot afford to buy other foods (except in minute quantities)—then the state in which the rice is eaten becomes of paramount importance. Parboiled rice, even when milled, is superior in nutritive value (particularly as regards the anti-beriberi vitamin) to raw rice milled to the same degree.

Pulses are rich in protein and in some of the B vitamins; 2–3 ozs. per day will increase the nutritive value of a diet largely composed of cereals. The soya bean is rich in protein and fat. If soya bean is to be widely used in India, considerable attention will have to be given to methods of preparing it in a palatable form. When cooked as a dhal, it does not seem, however, to have any advantage as a food for human being over other pulses in common use in India and the pulses in general are less valuable dietary supplements than animal foods such as milk, fish and meat. A preparation of germinated soya bean called the soya bean milk has, however, been shown to be nutritious and cheaper than cow's milk.

Fruits should particularly be included in children's diets. Plantains, a cheap fruit often supplied in hostels, are good food but not of exceptionally high nutritive value. Tomatoes and oranges and other "juicy" fruits are richer in vitamins and make a useful addition to diets of the poorer type. Whenever the question of cost precludes the use of fruit, a higher intake of green leafy vegetables will provide the nutrients usually obtainable from fruits.

In attempting to improve unsatisfactory diets it is often impossible to make sweeping changes and plan the whole diet afresh. The addition of a single food of high nutritive value such as milk, or green leafy vegetables, may in itself correct some of the more serious deficiencies of a diet and produce an improvement in the health of those who consume it. Daily doses of iron or calcium salts may have an excellent effect. Within recent years, the chemical constitution of a number of vitamins has been discovered and some of them can now be manufactured cheaply and in large quantities. Vitamins produced in this way are just as valuable to the body as vitamins contained in foods.

Recent developments in research and industry have made it possible to produce many vitamins in pure form and at a relatively low cost with the result that attempts to improve the nutritive value of foodstuffs by their addition have been made in more than one country. In England, vitamin B_1 made in a factory was, during the early years of the war, added to bread made from refined wheat flour to bring its nutritive value nearer to that of whole meal bread. In the United States of America, a few foods are being fortified with synthetic vitamins for the last few years. In India, the Nutrition Advisory Committee of the Indian Council of Medical Research has recommended fortification of toned milk and 'vanaspati' with vitamin A and of refined wheat flour with B vitamins. While these recommendations, when implemented, may help in improving the situation, it has to be emphasized that a permanent improvement in the state of nutrition can only be achieved through a suitable combination of ordinary foods in our daily diets.

The question of cost has been strongly emphasised in the preceding paragraphs. But cost is not always all-important. It is not only the poor, whose choice in the matter of food is extremely limited, who are ignorant and prejudiced about diet and suffer in health because of it. Plenty of people in India and elsewhere, who could afford to consume an excellent diet, and feed their children on an excellent diet, do not in fact do so. One can readily find among children of the more prosperous classes, cases of serious malnutrition and food deficiency disease. One of the tasks of those who are striving to improve diet in India is to educate the educated.

Human beings, and particularly children, cannot thrive at their best on a diet composed largely of cereals such as rice, millet, etc., and insufficiently supplemented by other foods. To make good the deficienices of such a diet, they must consume fair quantities of foods like milk, green vegetables, eggs, fruits, etc. These are sometimes known as "protective" foods, since they are rich in proteins, vitamins, and mineral salts and protect the body against the ills which result when the diet is largely based on less nutritious foods, such as milled rice. Fish liver oils, which are rich in vitamins A and D, may for present purposes be classed as most valuable "protective" foods.

In general, diets in India are defective because they do not contain "protective" foods in sufficient abundance. Our aim in public health nutrition work in general and in planning "well-balanced" diets, must be to increase intake of "protective" foods. The classes in the community which are particularly likely to suffer if their diet is defective are infants and growing children, and expectant and nursing mothers.

Malnutrition

It is advisable that those who are responsible for the institutional care of children, etc., and all who are concerned with practical nutrition work, should have some idea of the effects on the body of a diet which is ill-balanced and defective—e.g., of a diet which is largely composed of milled cereals and contains an insufficiency of protein, mineral salts and vitamins—and which calls for improvement. There is a long list of diseases, common in India, due in some way or other to dietetic causes. Such are : beriberi, certain anaemias of pregnancy, keratomalacia, osteomalacia. States of malnutrition which fall short of serious disease are wide-spread. A well-balanced diet is essential if growth and development are to take place normally. A badly fed child is often small for its age and thin; its "weight for height" will be below average. It will fall sick easily. The frequency of minor ailments in school children can be reduced by improving the diet. A certain apathy, a lack of "pep" of enthusiasm for work and play, is characteristic of the malnourished. The state of the skin is a sensitive index of faulty feeding; a rough dry skin, or a skin covered with a papular eruption suggests faulty feeding. Everybody knows that a well-fed animal exhibits a certain glossiness and sleekness of fur—a "good coat"—which is not seen in poorly fed animals. Similarly a well-fed human being has a glossy skin and a glow of health. Bright clear eyes are also a sign of a satisfactory feeding. Xerophthalmia (areas of dryness on the conjunctivae of the eyes sometimes covered with white exudative patches known as Bitot's spots) is associated with vitamin A deficiency. Sore mouth and tongue and excoriations at the angles of the mouth are found in ill-fed children; in the properly fed child the tongue should be smooth and evenly coloured and not show enlarged papillae, fissures and areas denuded of the superficial epithelium. Such lesions, occurring most commonly in milled rice eaters, may be due to riboflavin deficiency; they can often be rapidly cured by increasing milk intake. Spongy bleeding gums suggest vitamin C deficiency—mild scurvy—and call for a greater consumption of fresh fruits and vegetables.

Dietary Requirements of Expectant and Nursing Mothers

First, it must be realised that the well-being of the infant depends to a considerable extent on the diet of its mother during pregnancy and lactation. Reference to this point has already been made in previous sections. The nourishing of the child makes extra demands on the mother, and her requirements of proteins, vitamins and minerals are increased in consequence. "Extra" requirements during the later months of pregnancy and lactation have been indicated in the Table on page 15.

The Feeding of Infants

It is not proposed to include a full and detailed account of infant feeding methods in this Bulletin. Those specially concerned with this branch of the subject of nutrition should consult appropriate books and pamphlets. Two pamphlets published by the Indian Red Cross Society, "Diet for Nursing and Expectant Mothers" and "Hints on Weaning and Feeding Children", may be recommended; also "The Use of Fresh Milk in Infant Feeding" (May 1942) and "The Feeding of Children from Six Months to Six Years in War Time" (March 1944) both published by the Indian Research Fund Association, New Delhi. It will, however, be useful to emphasise a few points of importance in connection with the feeding of infants and make a number of suggestions.

Dietary Requirements of Infants

Up to the present, the subject of infant feeding in India has not been fully investigated by scientific methods, and only very tentative recommendations can

be made. The following figures represent roughly the daily calorie requirements of average normal infants of various ages:—

	Calories
1st week	200
1st month	240
2nd month	400
3rd month	450
5th month	600
8th month	700
12th month	800

These figures are 20–25 per cent. below those usually recommended in the case of infants in Europe and North America. In estimating the calorie requirements of infants, account is usually taken of both age and weight. An infant which is large, vigorous and healthy for its age may need more food than an ordinary infant of the same age, but, on the other hand, over-weight may be due to excessive deposits of fat caused by over-feeding, and call for a reduction of food intake to a point nearer the average. A small emaciated infant, far under-weight, requires more food than a better nourished infant to bring it into a normal condition. While calculations based on the actual weight of the child have certain advantages, it is often sounder, all things considered, to estimate an infant's food requirements from age rather than weight. It is quite simple to translate the schedule of calorie requirement given above into terms of food.

Breast Feeding

The main food of most infants is breast milk. Human milk yields 20 calories per oz., so that an average infant in the second month, fed exclusively at the breast, would require about 20 ozs. of milk a day—4 ozs. per feed if it is fed 5 times in the 24 hours. The breast milk secreted rarely exceeds 30 ozs. per day, and from 6 months onwards solid food may be supplied to provide the necessary calories. Artificially fed infants require slightly more milk than breast fed infants, since the fat and protein in the milk of the cow and other species are less easily assimilated by the infant than human milk and the wastage is therefore greater.

The best food for infants is breast milk. This statement is unquestionably true and is established not only by general experience but also by scientific observations. Breast milk has the advantage over other kinds of milk in that it is less likely to be contaminated; "artificial" feeding involves greater danger of infection, particularly among the poor whose sanitary standards are perforce low. Nevertheless, it is a mistake to assume that, because an infant is being nourished in the natural way at its mother's breast, everything is for the best, and no further attention to the infant or the mother is necessary. If the infant is to thrive on breast milk, it must receive regularly enough breast milk of good quality.

In actual fact, ill-nourished women of the poorer classes have often not got nearly enough milk to supply the needs of the growing infant. Everybody knows that the milk yield of cows in India is small compared to the yield of fat glossy-skinned cows fed in the rich pastures of Northern Europe and America. Exactly the same is true in the case of poor Indian women. The total quantity of milk which such women can give daily may be only one-third of that given by women fed on a richer diet. The average Indian infant at birth weighs somewhat less than the average European infant, but not very much less, and there is no reason to suppose that the food requirements of the former during the first year of life are much smaller than those of the latter. At the age of one year Indian infants of the poorer classes are on the average small and light as compared with the usual standards, and this may be in large part due to the fact that they have never received enough food.

The yield of breast milk can often be increased by improving the diet of the mother. It is, however, not very helpful simply to advise a poor woman to take more milk, ghee, vegetables, etc., since she usually cannot afford to buy such food in sufficient quantities.

The amount of milk supplied by a mother can be estimated by "test feeds" which means the careful weighing of the infant before and after feeding, or by completely expressing the milk from the breast into a sterile bottle before a number of feeds, and weighing it. In practice, the best guide to the adequacy of the milk supply is a regular and sufficient gain in weight, and test feeding is necessary only in the case of infants who fail to achieve an average gain of 4–5 ozs. per week.

Artificial Feeding

If the daily quantity of breast milk available is not enough, then the infant's diet should be supplemented by some other form of milk, suitably modified. Sometimes no breast milk at all is available for the infant, in which case it has to be entirely "bottle" fed. Cow's milk, the food most commonly used in the "artificial" feeding of infants, has a calorie value roughly similar to that of human milk. Goat's milk has a slightly higher calorie content. Buffalo's milk, which is very rich in fat, yields about 30 calories per oz.

Whatever type of milk is given as a substitute, it must be diluted with clean boiled water. The milk of cows, goats, and buffaloes is richer in protein than human milk, probably because the young of these species grow much faster than a baby; the protein of such milks is not, however, as suited to the infant as that of human milk. The addition of suitable amounts of water to such milks brings the protein content nearer to that of breast milk. Another point of importance is that human milk contains more sugar (lactose) than most other mammalian milks, and when these are diluted their sugar content falls far below that of human milk. To remedy this deficiency, it is usual to add sugar to milks given to infants to replace breast milk.

If cow's milk has to be given to an infant during the first few days of life, then a suitable dilution is 2 parts of water for 1 part of milk. The proportion of water may be gradually reduced so that by the end of that first week the milk mixture contains equal quantities of milk and water, and at 6 months whole milk is given. The amount of sugar added *per day* may be gradually increased from about 1 teaspoonful (about 5 grammes) in the first week to 4 teaspoonful at 6 months (about 24 grammes).

During the first few days of life the baby should be given 3–4 feeds per day. From this point until the end of the first month it may be given 6 feeds daily. Subsequently the number of feeds may be reduced to 5, this number being given throughout most of the first year of life.

It is essential that all milk given to infants should be boiled, and all utensils used in feeding should be steamed or boiled in clean water.

Vitamins and minerals.—Vitamin C in some form may be given from the 2nd month onward. The quantity given should correspond to a daily dose of not less than 5 milligrammes of vitamin C. About 10 c.c. (two and a half teaspoonful) of orange or tomato juice will usually supply this amount. Other kinds of fruit juice—papayya juice, mango juice, etc.—can be used as a source of this vitamin.

Infants fed on the breast milk of a healthy mother, or on whole cow's milk of good quality, can thrive without receiving additional supplies of vitamin A. It is, however, often recommended that cod or shark liver oil should be given to infants as a supplement, beginning with 2 drops a day at about the 15th day, the dose being increased gradually until one teaspoonful is reached by the end of the second month.

Cod or shark liver oil is of value in that it contains vitamin D. In many parts of India vitamin D is supplied by the action of sunlight on the skin. In parts of North India where rickets is not uncommon, vitamin D may be of great importance in infant feeding.

Premature and sickly children may be benefited by iron given in various forms. Children fed exclusively on milk for over nine months may develop anaemia, which can be prevented by the administration of iron.

Various forms of milk : Special "infant foods".—In many countries today there is an increasing tendency to use preserved milk and "infant foods" of various kinds in place of breast milk and fresh cow's milk. In India this practice is largely confined to the more prosperous classes, but it is not uncommon to find poor people buying tinned milk, etc., for their infants. Purchasers often feel that they are buying the best form of food for their babies and children. It is important that those concerned with teaching the people about food and diet should have a clear idea about the nature and value of such preparations.

Evaporated milk.—This is cow's milk from which water has been evaporated under reduced pressure at a sufficiently high temperature to destroy all bacteria. The resulting product is thick milk about twice as concentrated as fresh milk, which can be reconstituted into milk by the addition of water. Evaporated milk, sometimes called "unsweetened condensed milk" is a wholesome product, and can be used to replace other forms of milk in the diet of infants and adults. It has the disadvantage that it keeps for only a short time after the container is opened. Vitamin C is, however, destroyed in the manufacturing process, and it is essential that infants fed exclusively on such milk should be given this vitamin *e.g.*, in the form of fruit juice. If originally prepared from milk of high quality, evaporated milk may be superior in nutritive value to fresh milk obtained from inferior cows or subjected to adulteration.

Condensed milk (sweetened) is prepared in a similar manner to evaporated milk except that lower degrees of heat are employed. Cane sugar is added in large quantities; the final product may contain as much as 20 per cent. of sugar. Condensed sweetened milk cannot be recommended for infant feeding. The large amount of sugar present involves a proportionate decrease in the content of protein, fat and minerals. Further, the sugar may cause intestinal irritation and upset.

Dried or powdered milk.—This is cow's milk which has been rapidly dried to powder at a high temperature by various industrial processes. The resulting product is simply the solids of milk in powder form. Dried milk, which can be reconstituted into liquid milk by the addition of about 8 times its weight of water is a sound food product, much used in infant feeding. Various "humanised" dried milks have achieved wide popularity as infant foods. Vitamin C should always be given to infants fed on dried milk.

All these kinds of milk are produced in the "whole" or "skimmed" form*; the latter is prepared from milk from which the fat has been removed and is considerably cheaper than the former. No type of skimmed milk is suited to form the sole food of infants; its exclusive use may lead to a very serious eye disease called keratomalacia which is due to vitamin A deficiency and is a common cause of blindness. Condensed sweetened skimmed milk is particularly dangerous if used in this manner. Nevertheless, milk reconstituted from evaporated or dried skimmed milk can be used safely if some substance containing vitamin A *e.g.* cod or shark liver oil, is given at the same time. Actually skimmed milk reconstituted from powder can justifiably be recommended for infants of very poor mothers if it is the case of cheap skimmed milk or no milk at all. It is, however, essential that vitamin A should be given simultaneously. Older children living on a mixed diet can greatly benefit by skimmed milk.

* There are also half-cream preparations.

Various forms of infant foods.—(a) *Dried milk with malted cereals.*—Foods of this nature have little place in infant welfare work among the poor though they may be useful when given under medical supervision in special cases. The proportion of altered starch to milk is usually high (about 50 per cent.) and such foods, given alone, are unsuitable for prolonged feeding. Further, their cost is excessive in relation to their nutritive value.

(b) *Dried milk with unmalted cereals.*—Products with this composition can be criticised on the same grounds. They are unsuitable for infants under 6 months who cannot digest unaltered cereal starch.

(c) *Foods which are entirely composed of cereals.*—There is little justification for the use of such foods which are entirely unsuited to form the basis of an infant's diet. The food elements which they contain are similar to those present in ordinary cereals such as wheat and rice which can be bought at an infinitely lower price.

Weaning

An Expert Commission of the League of Nations makes the following recommendation about the duration of breast feeding :—

> "Breast feeding which is always superior to artificial feeding should be continued up to the age of six months at least even when mixed feeding is resorted to. It is useful to continue partial breast feeding up to nine months."

Ideally, weaning should take place as follows : At about the end of the 7th month the breast-fed infant's diet is supplemented by a certain amount of cow's milk and solid food, and its intake of breast milk correspondingly reduced. After about the 10th month it receives no more breast milk, the latter being replaced by cow's milk, which remains the most important constituent in the diet. Solid foods suitable for infants during the period of weaning include cereals (e.g., gruel congee, bread or chapattis with ghee or butter), pulses in various forms, tender green leafy vegetables and other kinds of vegetables cooked soft, mashed fruits, egg yolk, etc. Vegetable soups are to be recommended. During the first few months of life an infant cannot digest starch unless perhaps in very small quantities and any form of solid food is likely to cause gastric and intestinal trouble. From 6 months onwards it is usually able to assimilate starchy foods such as cereals.

At the age of one year the baby should receive plenty of solid food, including cereals, pulses, vegetables, fruits, etc., but a considerable proportion of the diet should consist of milk. This is necessary to satisfy adequately the protein needs of the infant for healthy growth. Faulty feeding during the post-weaning period may result not only in marked growth failure but may even lead to a protein deficiency condition known as nutritional oedema syndrome (kwashiorkor which, if untreated by high protein diets, often ends fatally.

The difficulties of infant welfare work in practice.—In the previous sections sound methods of infant feeding have been outlined. Those engaged in infant welfare work need a goal to aim at. In practice, however, it is often extremely difficult to apply such methods because of their cost. The greatest need of poor mothers and their infants attending welfare centres is usually more food (milk, etc.) and there is not enough money available to supply their requirements. The weaned infant often presents a problem of great difficulty. As long as it is receiving breast milk it may do fairly well, but if, on weaning it passes to a diet of, let us say, rice, congee and water, without sufficient milk, a great deterioration in its condition often takes place.

The usual practice in welfare centres in India, when poverty prevents the use of cow's milk, is to allow the mother to continue breast feeding even up to 2 years of age. The method gives satisfactory results provided it is possible for the mother to take additional good food and consume a diet satisfactory in quality and quantity. As regards the child, the most important aspect of weaning is the introduction of solids, not the stoppage of suckling.

It has been pointed out that even the breast-fed infants of apparently healthy mothers may not get enough nourishment. The enrichment of the diet of the mothers will increase the flow of milk and improve her health. Such infants may also be benefited by an extra daily feed of cow's milk. If, however, whole milk is out of the question, skimmed milk may legitimately be supplied, provided cod or shark liver oil is given simultaneously. Skimmed milk with cod liver oil may be given, before and after weaning, as supplementary foods to infants whose intake of milk is insufficient. There is the possibility that cheap malted cereals may be used to increase the calorie intake of infants, particularly infants under 6 months, but more work on this question is necessary.

If infants when partially or wholly weaned cannot be supplied with enough milk, malnutrition can be to some extent prevented by giving such foods as gruels based on whole cereals, various preparations of vegetables, mashed fruits, etc. The worst cases of malnutrition usually follow a diet which consists almost wholly of milled rice. Infant welfare workers should teach mothers how to prepare suitable cheap cereal, vegetable and fruit mixtures for their infants, the type of mixture depending on the local customs and the kinds of food which are cheap and available.

In the decade 1941–50, about ten million infants in India died before reaching the age of one year. A high percentage of these deaths was due to malnutrition.

Notes on Food Value Tables

The foodstuffs analysed were mostly obtained in the local market, Coonoor. Foods which may be described as common Indian foods, consumed throughout the country, originated in the majority of cases in the neighbouring plains of the Coimbatore district; others of a kind less widely used in India (*e.g.*, European vegetables such as lettuce) were largely grown in the neighbourhood of Coonoor, 6,000 feet above sea level. Among the foods analysed were some from other parts of India, including North India. The edible portion of the foodstuff, in as fresh a state as possible, was used for the analysis. The method of analysis is described in a paper in the Indian Journal of Medical Research.*

The figures given represent percentages, *i.e.*, grammes per 100 grammes. Iron is expressed as milligrammes per 100 grammes. Vitamin B_1 and riboflavin are given in microgrammes (μg); a microgramme is one-thousandth of a milligramme. The great variety of Indian measures makes it difficult to supply metric and avoirdupois equivalents for the weights used in the various States. In using the Bulletin in practice, the following conversion table may be useful:—

1 Seer=2 lbs.	=907·2 g.
1 lb. (avoirdupois)=8 chataks	=453·6 g.
1 chatak=2 oz.	= 56·8 g.
1 oz. (avoirdupois)=2½ tolas	= 28·4 g.
1 tola	= 11·6 g.
1 killogramme or 1000 gm.	= 2·2 lbs. (avoirdupois).
100 gm.	= 3·5 oz. (avoirdupois) or 8·62 tolas.

The vitamin A and carotene figures were assayed by chemical and spectrographic methods, while vitamin C was estimated chemically. In the case of vitamin B_1, biological and chemical methods were used. The absence of figures or estimates of vitamin content means that tests have not yet been carried out. The figures for nicotinic acid and riboflavin are partly based on analysis made in the laboratories and partly from published work in India.

*Ranganathan, Sundararajan and Swaminathan, Indian Journal of Medical Research, 1937, 24, 689.

TABLES OF

1 Serial number	2 Name of foodstuff	3 Botanical name	4 Moisture %	5 Protein %	6 Fat (Ether extractives) %	7 Mineral matter %	8 Fibre %	9 Carbohydrate %	10 Calcium (Ca) %	11 Phosphorus (P) %	12 Iron (Fe) mg. %	13 Calorific value per 100g.	14 Carotene (International Vitamin A units per 100g.)	15 Vitamin B_1* μg. per 100g.
													Cere	
1	Bajra or cambu.	Pennisetum typhoides.	12·4	11·6	5·0	2·7	1·2	67·1	0·05	0·35	8·8	360	220	[illegible]
2	Barley . .	Hordeum vulgare.	12·5	11·5	1·3	1·5	3·9	69·3	0·03	0·23	3·7	335	..	[illegible]
3	Cholam. .	Sorghum vulgare.	11·9	10·4	1·9	1·8	..	74·0	0·03	0·28	6·2	355	[illegible]	[illegible]
4	Italian millet	Setaria Italica.	11·2	12·3	4·7	3·2	8·0	60·6	0·03	0·29	6·3	334	[illegible]	[illegible]
5	"Kootu" or Buckwheat.	Fagopyrum esculentum.	11·3	10·3	2·4	2·4	8·6	65·0	0·07	0·30	13·2	323	..	[illegible]
6	Maize, tender	Zea Mays	79·4	4·3	0·5	0·7	..	15·1	0·01	0·10	0·7	82	[illegible]	[illegible]
7	Maize, dry .	Do.	14·9	11·1	3·6	1·5	2·7	66·2	0·01	0·33	2·1	342	..	[illegible]
8	Oatmeal .	Avena sterilis	10·7	13·6	7·6	1·8	3·5	62·8	0·05	0·38	3·8	374	Trace	[illegible]
9	Pani varagu .	Panicum miliaceum.	11·9	12·5	1·1	3·4	2·2	68·9	0·01	0·33	5·7	336	Trace	.
10	Ragi . .	Eleusine coracana.	13·1	7·1	1·3	2·2	..	76·3	0·33	0·27	5·4	345	70	410
11	Rice, raw, home-pounded.	Oryza sativa.	12·2	8·5	0·6	0·7	..	78·0	0·01	0·17	2·8	351	[illegible]	100
12	Rice, parboiled, home-pounded.		12·6	8·5	0·6	0·9	..	77·4	0·01	0·28	2·8	349	15	270
13	Rice, raw, milled.		13·0	6·9	0·4	0·5	..	79·2	0·01	0·11	1·0	348	0	[illegible]
14	Rice, parboiled, milled.		13·3	6·4	0·4	0·8	..	79·1	0·01	0·15	2·2	346	0	210
15	Rice, white, Puttu		13·0	7·5	0·4	0·4	..	78·7	0·01	0·08	3·3	348	..	..
16	Rice, black, Puttu.		12·3	7·7	1·3	1·3	0·7	76·7	0·01	0·24	4·9	349	..	..
17	Rice, flakes .		12·2	6·6	1·2	1·8	..	78·2	0·02	0·22	8·0	350	..	210
18	Rice, puffed .		14·7	7·5	0·1	3·4	..	74·3	0·02	0·16	6·2	328	..	210
19	†Rice, raw, unmilled (prepared in wooden grinder).		14·1	7·2	2·3	1·3	..	75·1	0·01	0·23	4·5	350	..	285
20	†Rice, raw, home-pounded.		14·5	6·8	1·4	1·1	..	76·2	0·01	0·21	3·6	345	..	240
21	Rice, raw, milled.		14·4	6·7	0·7	0·8	..	77·4	0·01	0·16	1·9	343	..	90
22	Samai . .	Panicum miliare.	11·5	7·7	4·7	4·8	7·6	63·7	0·02	0·36	7·1	328	Trace	300
23	Sanwa millet.	Echinochloa Colona Link var. frumantacea.	11·9	6·2	2·2	4·4	9·8	65·5	0·02	0·28	2·9	307	Trace	

*Whole grains are rich in vitamin B_1, while milled grains are largely deprived of this vitamin. As [illegible]

†These were prepared from the same sample of paddy.

FOOD VALUES

Nicotinic acid mg. per 100g.	Riboflavin µg. per 100g.	Vitamin C mg. per 100g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 µg.	Nicotinic acid, mg.	Riboflavin, µg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
als																		
3·2	..	..	3·5	3·3	1·4	0·6	0·3	19·1	14	99	3·1	102	63	94	0·9	..	..	1
4·7	244	..	3·6	3·3	0·4	0·4	1·1	19·7	8	65	1·1	95	..	128	1·3	69	..	2
1·8	364	..	3·3	3·0	0·5	0·5	..	21·0	8	79	1·8	101	39	98	0·5	103	..	3
0·7	..	..	3·2	3·5	1·3	0·9	2·3	17·2	8	82	1·8	95	15	166	0·2	..	..	4
4·4	341	..	3·2	2·9	0·7	0·7	2·4	18·4	20	85	3·8	92	..	256	1·3	97	..	5
0·6	50	4	2·3	1·2	0·1	0·2	..	4·3	3	28	0·2	23	12	34	0·2	14	1	6
1·4	100	..	4·2	3·2	1·0	0·4	0·8	18·8	3	93	0·6	97	..	119	0·4	28	..	7
1·1	..	..	3·0	3·9	2·2	0·5	1·0	17·8	14	110	1·1	106	Trace	153	0·3	..	..	8
..	..	..	3·4	3·6	0·3	1·0	0·6	19·6	3	94	1·6	95	Trace	..	..	..	..	9
1·1	..	..	3·7	2·0	0·4	0·6	..	21·7	94	77	1·5	98	20	119	0·3	..	..	10
2·4	120	..	3·5	2·4	0·2	0·2	..	22·2	3	5	0·8	100	1	51	0·7	34	..	11
4·0	120	..	3·6	2·4	0·2	0·3	..	22·5	3	80	0·8	99	4	77	1·1	34	..	12
1·2	80	..	3·7	2·0	0·1	0·1	..	22·0	3	31	0·3	99	..	17	0·3	23	..	13
3·8	..	..	3·8	1·8	0·1	0·2	..	22·5	3	40	0·6	98	..	60	1·1	..	..	14
..	..	..	3·7	2·1	<0·1	0·1	..	22·3	3	24	0·9	99	..	..	..	..	..	15
..	..	..	3·5	2·2	0·4	0·4	0·2	21·8	3	70	1·4	99	..	..	..	..	..	16
4·0	..	..	3·5	1·9	0·3	0·5	..	22·2	6	62	2·3	99	..	60	1·1	..	..	17
4·1	..	..	4·2	2·1	<0·1	1·0	..	21·1	6	45	1·8	93	..	60	1·2	..	..	18
4·6	..	..	4·0	2·0	0·7	0·4	..	21·3	3	65	1·3	99	..	81	1·3	..	..	19
..	..	..	4·1	1·9	0·4	0·3	..	21·6	3	60	1·0	98	..	68	..	..	..	20
..	..	..	4·1	1·9	0·2	0·2	..	22·0	3	45	0·5	97	..	26	..	..	..	21
..	..	..	3·3	2·2	1·3	1·4	2·2	18·1	6	100	2·0	93	Trace	85	..	..	..	22
..	..	..	3·4	1·8	0·6	1·3	2·8	18·6	6	790	0·8	87	Trace	..	..	..	..	23

Serial number	Name of foodstuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100 g.	Carotene (International Vitamin A units per 100g.)	Vitamin B_1 µg. per 100 g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Cere
24	Talipot, flour, untreated.	Caryota urens.	13·1	2·4	0·3	2·5	..	81·7	0·13	0·06	20·0	339	Nil	..
25	Talipot, flour, treated.*	Do.	7·3	1·3	0·1	1·9	..	89·4	0·09	0·04	22·2	364		..
26	Vermicelli	..	11·7	8·7	0·4	0·5	..	78·7	0·02	0·08	0·3	358	Trace	..
27	Varagu or kodu millet.	Paspalum scroticuatum.	12·8	8·3	1·4	2·9	9·0	65·6	0·04	0·24	5·2	308	Trace	330
28	Wheat, whole	Triticum aestivum	12·8	11·8	1·5	1·5	1·2	71·2	0·05	0·32	5·3	348	108	540
29	Wheat, flour, whole (atta).	Do.	12·2	12·1	1·7	1·8	..	72·2	0·01	0·32	7·3	353	..	..
30	Wheat flour, refined.	Do.	13·3	11·0	0·9	0·4	0·3	74·1	0·02	0·09	1·0	349	..	120
														Pul
1	Bengal gram (with outer husk).	Cicer arietinum.	9·8	17·1	5·3	2·7	3·9	61·2	0·15	0·24	9·8	361	316	300
2	Bengal gram, roasted (without outer husk).	Do.	11·2	22·5	5·2	2·2	..	58·9	0·07	0·31	8·9	372	..	..
3	"Bhetmas"	Glycine hispida.	8·8	41·3	17·0	4·5	4·3	24·1	0·21	0·60	9·9	415	..	..
4	Black gram without outer husk).	Phaseolus mungo.	10·9	24·0	1·4	3·4	..	60·3	0·20	0·37	9·8	350	64	420
5	Cow gram	Vigna catiang.	12·0	24·6	0·7	3·2	3·8	55·7	0·07	0·49	3·8	327	60	500
6	Field bean, dry.	Dolichos lablab.	9·6	24·9	0·8	3·2	1·4	60·1	0·06	0·45	2·0	347	Trace	520
7	Green gram (with outer husk).	Phaseolus aureus Roxb.	10·4	24·0	1·3	3·6	4·1	56·6	0·14	0·28	8·4	334	158	465
8	Horse gram	Dolichos biflorus.	11·8	22·0	0·5	3·1	5·3	57·3	0·28	0·39	7·6	322	119	420
9	"Khesari"	Lathyrus sativus.	10·0	28·2	0·6	3·0	..	58·2	0·11	0·50	5·6	351	200	..
10	Lentil (Masur dhal).	Lens culinaris Medic	12·1	25·1	0·7	2·1	..	59·7	0·13	0·25	2·0	346	450	450
11	Peas, dried	Pisum sativum.	16·0	19·7	1·1	2·1	4·5	56·6	0·07	0·30	4·4	315	..	450
12	Peas, roasted	Do.	9·9	22·9	1·4	2·3	..	63·5	0·03	0·36	5·0	358	..	..
13	"Rajma"		12·0	22·9	1·3	3·2	..	60·6	0·20	0·41	5·8	346	..	..
14	"Rawan"	Vigna sinensis.	12·7	23·4	1·3	2·9	—	59·7	0·07	0·43	4·3	344	..	..
15	Red gram (Dhal arhar) (without outer husk).	Cajanus cajan.	15·2	22·3	1·7	3·6	..	57·2	0·11	0·26	8·8	333	220	450
16	Soya bean	Glycine Max. Merr.	8·1	43·2	19·5	4·6	3·7	20·9	0·24	0·69	11·5	432	710	730

* Soaked with 4 times its weight of water allowed to settle overnight, supernatant liquid discarded and residue Sun-dried.

FOOD VALUES—contd.

Nicotinic acid mg. per 100g.	Riboflavin μg. per 100g.	Vitamin C mg. per 100 g.†	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
als.—contd.																		
..	..	..	3·7	0·7	0·1	0·7	..	23·2	37	17	5·7	96	*Nil*	..	..	..	..	24
..	..	..	2·1	0·4	<0·1	0·5	..	25·4	25	11	6·3	103		..	..	..	..	25
.	271	..	3·3	2·5	0·1	0·1	..	22·3	6	24	0·1	102	Trace	..	..	77	..	26
..	.	..	3·6	2·4	0·4	0·8	2·6	18·6	10	70	1·5	87	Trace	94	..	..	..	27
5·0	120	..	3·6	3·4	0·4	0·4	0·3	20·2	14	91	1·5	98	31	153	1·4	34	..	28
..	..	..	3·5	3·4	0·5	0·5	..	20·5	11	91	2·0	100	..	..	..	..	..	29
0·9	..	..	3·8	3·1	0·3	0·1	0·1	21·0	6	26	0·3	99	..	11	0·3	..	..	30
ses																		
2·6	509	..	2·8	1·9	1·5	0·8	1·1	17·4	54	68	2·8	103	90	28	0·7	145	..	1
..	389	..	3·2	6·4	1·5	0·6	..	16·7	20	88	2·5	106	..	..	..	110	..	2
..	..	..	2·5	11·7	4·8	1·3	1·2	6·8	60	170	2·8	118	..	..	..	..	..	3
2·0	370	..	3·1	6·8	0·4	1·0	..	17·1	60	100	2·8	99	18	119	0·6	105	..	4
1·3	477	..	3·4	7·0	0·2	0·9	1·1	15·8	20	140	1·1	95	17	142	0·4	135	..	5
1·8	..	..	2·7	7·1	0·2	0·9	0·4	17·0	20	130	0·6	99	Trace	148	0·5	..	..	6
2·0	387	..	3·0	6·8	0·4	1·0	1·2	16·1	40	80	2·4	95	45	132	0·6	110	..	7
1·5	195	..	3·4	6·3	0·1	0·9	1·5	16·3	80	110	2·1	91	31	119	0·4	55	..	8
..	414	.	2·8	8·0	0·2	0·9	..	16·5	31	140	1·6	100	57	..	..	118	..	9
1·5	489	..	3·5	7·1	0·2	0·6	..	17·0	37	70	0·6	98	128	128	0·4	139	..	10
1·3	500	..	4·5	5·6	0·3	0·6	1·3	16·1	20	85	1·3	89	..	128	0·4	142	..	11
..	..	..	2·8	6·5	0·4	0·7	..	18·0	8	100	1·4	102	..	..	..	..	..	12
..	..	..	3·4	6·5	0·4	0·9	..	17·2	74	120	1·6	98	..	..	..	..	..	13
..	..	..	3·6	6·7	0·4	0·8	..	17·0	23	120	1·2	98	..	..	..	..	..	14
2·4	506	..	4·3	6·3	0·5	1·0	..	16·2	40	70	2·5	95	62	128	0·7	144	..	15
2·4	760	..	2·3	12·3	5·5	1·3	1·1	5·9	70	200	3·3	123	202	207	0·7	216	..	16

†Sprouted pulses contain 10–15 milligrammes of vitamin C per 100 grammes.

Serial number	Name of foodstuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100g.	Carotene (International Vitamin A units per 100g.)	Vitamin B_1 μg per 100g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Leaf
1	"Agathi"	Sesbania grandiflora.	71·1	8·4	1·4	3·1	2·2	11·8	1·13	0·08	3·9	93	9,000	—
2	Amaranth, tender.	Amaranthus tricolor.	85·8	4·9	0·5	3·1	..	5·7	0·50	0·10	21·4	47	2,500 to 11,000	30
3	Amaranth, spined.	Amaranthus, spinosus.	85·0	3·0	0·3	3·6	..	8·1	0·80	0·05	22·9	47	..	—
4	Bamboo, tender shoots.	Bambusa bambos.	87·1	3·9	0·5	1·4	..	7·5	0·02	0·09	0·1	47	Trace	..
5	"Bathua" leaves.	Chenopodium album.	87·9	4·7	0·4	3·3	..	3·7	0·15	0·08	4·2	37	..	..
6	Bengal gram leaves.	Cicer arietinum.	77·8	7·0	1·4	2·1	..	11·7	0·34	0·12	23·8	87	..	..
7	Brussels sprouts.	Brassica oleracea gemmifera.	84·6	4·7	0·5	1·0	..	9·2	0·05	0·08	2·3	60	210	50
8	Cabbage	Brassica oleracea capitata.	90·2	1·8	0·1	0·6	1·0	6·3	0·03	0·05	0·8	33	2,000	60
9	Carrot leaves	Daucus Carota.	83·3	5·1	0·5	2·8	..	8·3	0·34	0·11	8·8	58	..	..
10	Celery	Apium graveolens. Var.dulce.	81·3	6·0	0·6	2·1	1·4	8·6	0·23	0·14	6·3	64	5,800 to 7,500	Trace
11	"Colombo keera".	..	91·3	2·5	0·4	2·1	..	3·7	0·09	0·13	11·9	28	..	..
12	Coriander	Coriandrum sativum.	87·9	3·3	0·6	1·7	..	6·5	0·14	0·06	10·0	45	10,460 to 12,600	50
13	Curry leaves	Murraya koenigii.	66·3	6·1	1·0	4·2	6·4	16·0	0·81	0·6	3·1	97	12,600	80
14	Drumstick	Moringa oleifera.	75·0	6·7	1·7	2·3	0·9	13·4	0·44	0·07	7·0	96	11,300	60
15	Fenugreek	Trigonella foenum-graecum.	81·3	4·9	0·9	1·6	1·0	9·8	0·47	0·05	16·9	67	3,900	40
16	Garden cress	Lepidium sativum.	82·3	5·4	1·0	2·2	..	8·7	0·36	0·11	28·6	67	..	150
17	"Gogu" or Red Sorrel.	Hibiscus sabdariffa.	86·2	1·7	1·1	1·0	..	10·0	0·18	0·04	5·4	57		
18	Gram leaves	Circer arietinum.	60·0	8·2	0·5	3·5	..	27·2	0·31	0·21	28·3	146	6,700	
19	Ipomoea	Ipomoea reptans.	90·3	2·0	1·4	2·1	..	4·3	0·11	0·05	3·9	32	3,300	50

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin μg. per 100 g.	Vitamin C mg. per 100 g.	Values per Ounce: Moisture g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Vegetables																		
..	..	..	20·8	2·4	0·4	0·9	0·6	3·3	320	30	1·1	26	2,570	..	..	..	..	1
0·9	100	173	24·4	1·4	0·1	0·9	..	1·6	140	30	6·1	13	710 to 3,120	8	0·3	28	49	2
..	..	..	24·1	0·9	0·1	1·0	..	2·3	220	10	6·5	13	..	..	..	..	..	3
0·2	..	..	24·7	1·1	<0·1	0·4	..	2·1	6	26	<0·1	13	Trace	..	0·1	..	..	4
..	145	..	25·0	1·3	0·1	0·9	..	1·0	42	20	1·2	11	..	..	..	41	..	5
..	..	..	22·1	2·0	0·4	0·6	..	3·3	97	34	6·8	25	..	..	..	..	..	6
0·4	..	72	24·0	1·3	0·1	0·3	..	2·6	10	20	0·7	17	60	14	0·1	..	20	7
0·4	30	124	25·6	0·5	<0·1	0·2	0·3	1·8	8	14	0·2	9	568	17	0·1	9	35	8
0·4	144	..	23·7	1·4	0·1	0·8	..	2·3	96	31	2·5	16	..	..	0·1	41	..	9
..	..	62	23·1	1·7	0·2	0·6	0·4	2·4	65	40	1·8	18	1,647 to 2,130	Trace	..	..	18	10
..	..	..	25·9	0·7	0·1	0·6	..	1·0	25	37	3·4	8	..	..	..	..	..	11
0·8	60	135	25·0	0·9	0·2	0·5	..	1·8	40	17	2·8	13	2,970 to 3,580	14	0·2	17	38	12
2·3	208	4	18·8	1·7	0·3	1·2	1·8	4·5	230	17	0·9	28	3,580	23	0·7	59	1	13
0·8	..	220	21·3	1·9	0·5	0·7	0·3	3·8	120	20	2·0	27	3,210	17	0·2	..	62	14
0·8	162	..	23·2	1·4	0·3	0·5	0·3	2·8	130	14	4·8	19	1,108	11	0·2	46	..	15
..	..	..	23·4	1·6	0·3	0·6	..	2·5	100	30	8·1	19	..	43	..	..	..	16
..	102	..	24·5	0·5	0·3	0·3	..	2·8	51	11	1·5	16	..	..	..	29	..	17
..	..	..	17·2	2·3	0·1	1·0	..	7·7	83	60	8·0	41	1,903	..	..	..	..	18
0·6	120	137	25·6	0·8	0·1	0·6	..	1·2	31	11	1·1	9	937	14	0·2	34	39	19

Serial number	Name of Foodstuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100g.	Carotene (International Vitamin A Units per 100g.)	Vitamin B_1 µg. per 100g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Leafy
20	Khesari leaves	Lathyrus sativus.	84·2	6·1	1·0	1·1	..	7·6	0·16	0·10	7·3	64	6,000	
21	Lettuce	Lactuca sativa.	92·9	2·1	0·3	1·2	0·5	3·0	0·05	0·03	2·4	23	2,200	40
22	Lettuce tree leaves, tender.	Pisonia alba.	88·6	3·6	0·2	2·2	..	5·4	0·17	0·06	3·6	38	..	..
23	Lettuce tree leaves, mature.	Do.	81·7	5·1	0·4	2·6	..	10·2	0·32	0·08	2·6	65	..	..
24	"Manathakkali".	Solanum nigrum.	82·1	5·9	1·0	2·1	..	8·9	0·41	0·07	20·5	68	..	..
25	Mint	Mentha spicata.	83·0	4·8	0·6	1·6	2·0	8·0	0·20	0·08	15·6	57	2,700	50
26	Neem, mature	Azadirachta indica.	59·4	7·1	1·0	3·4	6·2	22·9	0·51	0·08	17·1	129	..	..
27	Neem, tender	Do.	59·4	11·6	3·0	2·6	2·2	21·2	0·13	0·19	25·1	158	1,950	90
28	Parsley	Petroselinum. crispum.	68·4	5·9	1·0	3·2	1·8	19·7	0·39	0·20	17·9	111	3,200	40
29	"Ponnanganni".	Alternanthera amoena.	77·4	5·0	0·7	2·5	..	14·4	0·51	0·06	16·7	84	..	..
30	Rape leaves	Brassica napus.	84·9	5·1	0·4	2·5	..	7·1	0·37	0·11	12·5	52	..	..
31	Safflower leaves.	Carthamus tinctorius.	90·9	3·3	0·7	1·9	..	5·1	0·18	0·06	7·6	39	3,500	..
32	Spinach	Spinacia oleracca.	91·7	1·9	0·9	1·5	..	4·0	0·06	0·01	5·0	32	2,600 to 3,500	50
33	Soya leaves	Glycine Max. Merr	79·5	6·0	0·5	3·2	..	10·8	0·18	0·19	8·0	72	..	..
34	Water cress	Nasturtium officinale.	89·2	2·9	0·2	2·2	..	5·5	0·29	0·14	4·6	35	..	..
														Roots and
1	"Arwa gadda"	..	74·3	1·4	0·1	0·6	..	23·6	0·03	0·02	2·2	101	..	..
2	Banana root	..	84·7	0·5	0·1	1·0	1·3	12·4	0·03	<0·01	1·1	52	38	Trace
3	Beet root	Beta vulgaris.	33·8	1·7	0·1	0·8	..	13·6	0·20	0·06	1·0	62	Trace	40
4	Canna, edible	Canna edulis.	75·1	1·4	0·3	0·8	..	22·4	0·01	0·02	0·8	97	*Nil*	..
5	Carrot	Daucus carota.	89·0	0·9	0·2	1·1	1·2	10·7	0·03	0·05	1·5	47	2,200 to 4,300	90
6	Colocasia	Colocasia esculenta.	73·1	3·0	0·1	1·7	..	22·1	0·04	0·14	2·1	101	40	90
7	Nulu gadda"	..	76·8	1·1	0·2	0·5	..	21·4	0·07	0·02	1·4	92	..	..
8	Onion, leaf	Allium cepa.	86·1	1·2	<0·1	0·4	..	11·6	0·13	0·05	0·7	54	..	..
9	Onion, small	Do.	84·3	1·8	0·1	0·6	..	13·2	0·04	0·06	1·2	61	25	90

FOOD VALUES—contd.

Nicotinic acid mg. per 100g.	Riboflavin μg. per 100 g.	Vitamin C mgs. per 100 g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Vegetables.—contd.																		
..	..	..	23·9	1·7	0·3	0·3	..	2·2	45	30	2·1	18	1,704	..	..	..	..	20
0·4	120	15	26·4	0·6	<0·1	0·3	0·1	0·9	14	8	0·7	7	625	11	0·1	34	4	21
..	..	..	23·2	1·5	0·1	0·7	..	2·9	90	23	0·7	18	..	..	..	..	..	22
..	..	..	25·2	1·0	<0·1	0·6	..	1·5	50	17	1·0	11	..	..	..	..	..	23
..	..	11	23·3	1·7	0·3	0·6	..	2·5	120	20	5·0	19	..	..	..	..	3	24
0·4	80	..	23·6	1·4	0·2	0·5	0·6	2·3	60	23	4·4	16	767	14	0·1	23	..	25
1·4	..	..	16·9	2·0	0·3	1·0	1·8	6·5	140	23	4·9	37	..	..	0·4	..	..	26
..	..	..	16·9	3·3	0·9	0·7	0·6	6·0	37	54	7·2	45	1,306	17	..	..	..	27
0·5	..	281	19·4	1·7	0·3	0·9	0·5	5·6	110	57	5·1	32	909	11	0·1	..	80	28
..	..	..	22·0	1·4	0·2	0·7	..	4·1	144	17	4·7	24	..	..	..	..	..	29
..	..	..	24·1	1·4	0·1	0·7	..	2·0	105	31	3·6	15	..	..	..	..	..	30
..	..	..	25·5	0·9	0·2	0·3	..	1·4	51	17	2·2	11	1,562	..	..	..	..	31
0·5	60	48	26·0	0·5	0·3	0·4	..	1·1	17	3	1·4	9	738 to 994	14	0·1	17	14	32
..	160	..	22·6	1·7	0·1	0·9	..	3·1	51	54	2·3	20	..	..	..	46	..	33
..	..	..	25·3	0·8	<0·1	0·6	..	1·6	82	40	1·3	10	..	..	..	..	..	34
Tubers																		
..	..	..	21·1	0·4	<0·1	0·2	..	6·7	8	6	0·6	29	..	..	..	..	..	1
0·2	48	1·0	24·0	0·1	<0·1	0·3	0·4	3·5	9	<3	0·3	15	11	Trace	0·1	14	0·3	2
0·4	90	<88	28·8	0·5	<0·1	0·2	..	3·9	57	17	0·3	18	Trace	11	0·1	26	<25	3
..	..	13·0	21·3	0·4	0·1	0·2	..	6·4	3	6	0·2	28	*Nil*	..	..	..	3·7	4
0·4	20	3	24·4	0·3	<0·1	0·3	0·3	3·0	23	8	0·4	13	568 to 1,221	11	0·1	6	1	5
0·4	30	Trace	20·8	0·9	<0·1	0·5	..	6·3	11	40	0·6	29	11	26	0·1	9	Trace	6
..	..	..	21·8	0·3	0·1	0·1	..	6·1	20	6	0·4	26	..	..	..	..	..	7
0·4	10	11	24·6	0·3	<0·1	0·1	..	3·3	50	14	0·2	14	..	23	0·1	3	3	8
0·5	..	..	23·9	0·5	<0·1	0·2	..	3·7	10	20	0·3	17	7		0·1	..		9

Serial number	Name of Foodstuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100g.	Carotene (International Vitamin A Units per 100g.)	Vitamin B_1 µg. per 100g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Roots and
10	"Onthalai-gasu".	Dioscorea alata.	84·4	1·2	0·1	0·3	..	14·0	0·01	0·02	0·5	62	..	..
11	Parships .	Pastinaca sativa	72·4	1·3	0·3	1·1	1·7	23·2	0·05	0·04	0·4	101	30	60
12	Potato .	Solanum tuberosum.	74 7	1·6	0·1	0·6	..	22·9	<0·01	0·03	0·7	99	40	100
13	Radish(pink)	Raphanus sativus.	90.8	0·6	0·3	0·9	..	7·4	0·05	0·02	0·5	35	5	60
14	Radish (white).	Do.	94·4	0·7	0·1	0·6	..	4·2	0·05	0·03	0·4	21		
15	Sweet Potato	Ipomeoa batatas.	68·5	1·2	0·3	1·0	..	31·0	0·02	0·05	0·8	132	10	80
16	Tapioca .	Manihot esculenta	59·4	0·7	0·2	1·0	..	38·7	0·05	0·04	0·9	159	..	45
17	Yam (elephant)	Amorpho-phallus camapanu-latus.	78·7	1·2	<0·1	0·8	0·8	18·4	0·05	0·02	0·6	79	434	60
18	Yam (ordinary).	Typhonium trilobatum.	69·9	1·4	0·1	1·6	..	27·0	0·06	0·02	1·3	115	..	72
														Other
1	Amaranth stem.	Amaranthus gangeticus.	92·5	0·9	0·1	1·8	1·2	3·5	0·26	0·03	1·8	19	..	..
2	Artichoke .	Cynara scolymus.	77·3	3·6	0·1	1·8	1·2	16·0	0·12	0·10	2·3	79	63	225
3	Ash gourd .	Benincasa hispida.	96·0	0·4	0·1	0·3	..	3·2	0·03	0·02	0·5	15	Trace	63
4	Bitter gourd.	Momordica charantia.	92·4	1·6	0·2	0·8	0·8	4·2	0·02	0·07	2·2	25	210	72
5	Bitter gourd (small variety).	Do.	83·2	2·9	1·0	1·4	1·7	9·8	0·05	0·14	9·4	60		
6	Brinjal .	Solanum melongena.	91·5	1·3	0·3	0·5	..	6·4	0·02	0·06	1·3	34	5	45
7	Broad beans	Vicia faba	82·4	4·5	0·1	1·0	2·0	10·0	0·05	0·06	1·6	59	..	80
8	Calabash cucumber.	Lagenaria siceraria.	96·3	0·2	0·1	0·5	..	2·9	0·02	0·01	0·7	13	Trace	..
9	Cauliflower .	Brassica oleracea botrytis.	89·4	3·5	0·4	1·4	..	5·3	0·03	0·06	1·3	39	38	100
10	"Cho-cho" marrow.	Sechium edule.	92·5	0·7	0·1	0·4	..	6·3	0·14	0·03	0·6	29	Trace	..

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin μg. per 100g	Vitamin C mg. per 100g.	Values per Ounce															
			Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Tubers.—contd.																		
..	..	..	23·9	0·3	<0·1	0·1	..	4·0	3	6	0·1	18	..	..	..	..	..	10
0·4	..	16	20·5	0·4	0·1	0·3	0·5	6·6	10	10	0·1	29	8	17	0·1	..	4	11
1·2	10	17	21·2	0·5	<0·1	0·2	..	6·5	3	9	0·2	28	1	28	0·3	3	1	12
0·4	20	17	25·7	0·2	0·1	0·3	..	2·1	10	6	0·1	10	1	17	0·1	6	5	13
0·5		15	26·8	0·2	<0·1	0·2	..	1·2	10	8	0·1	6				..	4	14
0·7	40	24	18·8	0·3	0·1	0·3	..	8·8	6	10	0·2	37	3	23	0·2	11	7	15
0·3	100	..	16·8	0·2	0·1	0·3	..	10·9	10	10	0·2	45	..	13	0·1	28	..	16
0·7	70	Trace	22·3	0·3	<0·1	0·2	0·2	5·2	10	6	0·2	22	123	17	0·2	20	Trace.	17
0·7	..	Trace	19·8	0·4	<0·1	0·5	..	7·7	20	6	0·4	33	..	20	0·2	·	Trace.	18
Vegetables																		
-	..	..	26·2	0·3	<0·1	0·5	0·3	1·0	74	8	0·5	5	..	..	..	..	..	1
..	10	Trace	21·9	1·0	<0·1	0·5	0·3	4·5	34	30	0·7	22	17	64	..	3	Trace.	2
0·4	..	1	27·3	0·1	<0·1	<0·1	..	0·9	8	6	0·1	4	Trace	13	0·1	0	<1	3
0·5	90	88	26·2	0·5	0·1	0·2	0·2	1·2	6	20	0·6	7	60	20	0·1	26	25	4
..	..	..	23·6	0·8	0·3	0·4	0·5	2·8	10	40	2·7	17						5
0·8	90	23	25·9	0·4	0·1	0·1	..	1·8	60	17	0·4	10	1	13	0·2	26	6	6
0·8	..	12	23·1	1·3	<0·1	0·3	0·6	2·8	14	17	0·5	17	..	23	0·2	..	3	7
..	10	..	27·3	0·1	<0·1	0·1	..	0·8	6	2	0·2	4	Trace	..	..	3	..	8
0·9	80	66	25·3	1·0	0·1	0·4	..	1·5	8	17	0·4	11	11	28	0·3	23	19	9
..	..	..	26·2	0·2	<0·1	0·1	..	1·8	40	8	0·2	8	Trace	..	..	..	..	10

Serial number	Name of Foodstuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100 g.	Carotene (International Vitamin A units per 100 g.)	Vitamin B_1 µg. per 100 g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Other
11	Celery stalks	Apium graveolens var. dulce.	93·5	0·8	0·1	0·9	1·2	3·5	0·03	0·04	4·8	18	..	..
12	Cluster beans	Cyamopsis tetragonoloba.	82·5	3·7	0·2	1·4	2·3	9·9	0·13	0·05	5·8	56	330	.
13	Colocasia stems.	Colocasia esculenta.	93·4	0·3	0·3	1·2	0·6	4·2	0·06	0·02	0·5	21	..	..
14	Cucumber .	Cucumis sativus.	96·4	0·4	0·1	0·3	..	2·8	0·01	0·03	1·5	14	Trace	30
15	Double beans	Faba vulgaris.	73·8	8·3	0·3	1·0	4·3	12·3	0·04	0·14	2·3	85	..	..
16	Drumstick .	Moringa oleifera.	86·9	2·5	0·1	2·0	4·8	3·7	0·03	0·11	5·3	26	184	50
17	French beans	Phaseolus vulgaris.	91·4	1·7	0·1	0·5	1·8	4·5	0·05	0·03	1·7	26	221	78
18	Ipomoea stems.	Ipomoea reptans.	93·7	0·9	0·2	1·8	..	3·4	0·08	0·03	0·8	19	..	..
19	Jack, tender	Artocarpus heterophyllus	84·0	2·6	0·3	0·9	2·8	9·4	0·03	0·04	1·7	51	..	50
20	Jack fruit seeds	Do. .	51·6	6·6	0·4	1·5	1·5	38·4	0·05	0·13	1·2	184	..	..
21	"Kandan Kathairi".	Solanum xanthocarpum.	75·5	3·1	0·8	1·6	14·2	4·8	0·10	0·09	1·2	39	..	..
22	"Kovai" fruit, tender.	Coccinia cordifolia.	93·1	1·2	0·1	0·5	1·6	3·5	0·04	0·03	1·4	20	260	..
23	Knol-khol .	Brassica caulorapa.	92·1	1·1	0·2	0·7	..	5·9	0·02	0·04	0·4	30	36	50
24	Ladies fingers	Abelmoschus esculentus.	88·0	2·2	0·2	0·7	1·2	7·7	0·09	0·08	1·5	41	58	63
25	Leeks .	Allium porrum.	78·9	1·8	0·1	0·7	1·3	17·2	0·05	0·07	2·3	77	30	225
26	Mango, green	Mangifera indica.	90·0	0·7	0·1	0·4	..	8·8	0·01	0·02	4·5	39	150	40
27	"Nellikai" (amla).	Phyllanthus emblica.	81·2	0·5	0·1	0·7	3·4	14·1	0·05	0·02	1·2	59	..	30
28	Nut of Avocado pear.	Persea drymifolia.	63·7	2·5	0·7	1·1	..	32·0	0·02	0·08	1·2	144	..	..
29	Onion stalks	Allium cepa	87·6	0·9	0·2	0·8	1·6	8·9	0·05	0·05	7·5	41	..	..
30	"Parwar" .	Trichosanthes dioica.	92·3	2·0	0·3	0·5	3·0	1·9	0·03	0·04	1·7	18	..	..
31	Peas, Fresh	Pisum sativum.	72·1	7·2	0·1	0·8	..	19·2	0·02	0·08	1·5	109	158	250

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin µg. per 100 g.	Vitamin C mg. per 100 g.	Value per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca) mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A units)	Vitamin B_1 µg.	Nicotinic acid, mg.	Riboflavin, µg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Vegetables—contd.																		
..	..	6	26·5	0·2	<0·1	0·2	0·3	1·0	8	11	1·4	5	..	..	..	..	2	11
..	..	49	23·4	1·1	0·1	0·4	0·7	2·8	37	14	1·6	16	94	..	..	..	14	12
..	..	..	26·5	0·1	0·1	0·3	0·2	1·2	17	6	0·1	6	..	..	..	..	..	13
0·2	4	7	27·3	0·1	<0·1	0·1	..	0·8	3	8	0·4	4	Trace	8	0·1	1	2	14
..	..	22	20·9	2·4	0·1	0·3	1·2	3·5	1	40	0·7	29	..	..	..	..	6	15
0·2	65	120	24·6	0·7	<0·1	0·6	1·4	1·0	8	30	1·5	7	52	14	0·1	18	34	16
0·3	59	14	25·9	0·5	<0·1	0·1	0·5	1·3	14	8	0·5	7	63	22	0·1	14	4	17
..	..	..	26·6	0·3	0·1	0·5	..	1·0	23	8	0·2	5	..	..	..	..	..	18
0·2	..	..	23·8	0·7	0·1	0·3	0·8	2·7	8	11	0·5	14	..	14	0·1	..	..	19
..	..	..	14·6	1·9	0·1	0·4	0·4	10·9	14	37	0·3	52	..	..	..	..	..	20
..	..	..	21·4	0·9	0·2	0·5	4·0	1·4	30	25	0·3	11	..	..	..	..	..	21
..	..	28	26·4	0·3	<0·1	0·1	0·5	1·0	11	8	0·4	6	74	..	..	..	8	22
0·5	88	85	26·1	0·3	0·1	0·2	..	1·7	6	11	0·1	9	10	14	0·1	25	24	23
0·6	60	16	24·9	0·6	0·1	0·2	0·3	2·2	25	23	0·4	12	16	18	0·2	17	4	24
..	..	11	22·4	0·5	<0·1	0·2	0·4	4·9	14	20	0·6	22	8	64	..	..	3	25
0·2	10	3	25·5	0·2	<0·1	0·1	..	2·5	3	6	1·3	11	43	11	0·1	3	1	26
0·2	..	600	23·0	0·1	<0·1	0·2	1·0	4·0	14	6	0·3	17	..	8	0·1	..	170	27
..	..	..	18·0	0·7	0·2	0·3	..	9·1	6	23	0·3	41	..	..	..	..	..	28
..	30	..	24·8	0·3	0·1	0·2	0·5	2·5	14	14	2·1	12	..	..	..	9	..	29
..	..	..	26·2	0·1	0·1	0·1	0·9	0·5	8	11	0·5	5	..	..	..	..	..	30
0·8	10	9	20·4	2·0	<0·1	0·2	..	5·6	6	23	0·4	31	39	71	0·2	3	3	31

Serial number	Name of foodstuff	Botanical name.	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg %	Calorific value per 100 g.	Carotene (International Vitamin A units per 100 g.	Vitamin B_1 [illegible] per 100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Other
32	Pink beans .	Phaseolus vulgaris.	88·5	2·4	0·2	0·6	2·1	6·2	0·04	0·04	1·2	36	..	..
33	Plantain flower.	Musa sapientum.	90·2	1·5	0·2	1·2	1·9	5·0	0·03	0·05	0·1	28	..	50
34	Plantain, green.	Do.	83·2	1·4	0·2	0·5	..	14·7	0·01	0·03	0·6	66	50	45
35	Plantain, stem	Do.	93·3	0·5	0·1	0·6	0·8	9·7	0·01	0·01	1·1	42	*Nil*	20
36	Pumpkin .	Cucurbita maxima.	92·6	1·4	0·1	0·6	..	5·3	0·01	0·03	0·7	28	84	60
37	Rape plant stem.	Brassica napus.	91·4	3·1	0·1	1·4	..	4·0	0·10	0·10	1·2	29	..	..
38	Rhubarb stalks.	Rheum Rhaponticum.	92·7	1·1	0·5	1·1	0·	3·7	0·12	0·01	2·2	24	..	..
39	Ridge gourd	Luffa acutangula.	95·4	0·5	0·1	0·3	.	3·7	0·04	0·04	1·6	18	56	66
40	"Singhara" or water chest nut.	Trapa bispinosa.	70·0	4·7	0·3	1·1	..	23·9	0·02	0·15	0·8	117	20	50
41	Snake-gourd	Trichosanthes anguina.	94·1	0·5	0·3	0·7	..	4·4	0·05	0·02	1·3	22	160	40
42	Spinach stalks	Spinacia oleracea.	93·4	0·9	0·1	1·8	..	3·8	0·09	0·02	1·3	20	..	.
43	"Sundakai" dry.	Solanum torvum.	12·3	8·3	1·7	5·1	17·6	55·0	0·37	0·18	22·2	269	750	.
44	Sword beans .	Canavalia gladiata.	88·6	2·7	0·2	0·6	1·5	6·4	0·06	0·04	2·0	38	40	80
45	"Tinda" tender.	Citrullus vulgaris.	92·3	1·7	0·1	0·6	..	5·3	0·02	0·03	0·9	29	28	.
46	Tomato, green	Lycopersicon esculentum.	92·8	1·9	0·1	0·7	..	4·5	0·02	0·04	2·4	27	320	69
47	Turnip .	Brassica rapa.	91·1	0·5	0·2	0·6	.	7·6	0·03	0·04	0·4	34	Trace	40
48	Vegetable marrow.	Cucurbita pepo.	94·8	0·5	0·1	0·3	.	4·3	<0·01	0·03	0·6	20	Trace	..
														Nuts and
1	Almond .	Prunus amygdalus.	5·2	20·5	53·9	2·9	1·7	10·5	0·23	0·49	3·5	655	Trace	240
2	Cashew nut .	Anacardium occidentale.	5·9	21·2	46·9	2·4	1·3	22·3	0·05	0·45	5·0	596	100	630
3	Coconut .	Cocos nucifera.	50·4	4·5	41·6	1·9	3·6	13·0	0·01	0·24	1·7	444	Trace	45
4	Gingelly seeds	Sesamum indicum.	4·1	18·3	43·3	5·2	2·9	25·2	1·45	0·57	10·5	564	100	1010

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin μg. per 100 g.	Vitamin C mg. per 100 g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Vegetables—contd.																		
·	..	28	25·1	0·7	<0·1	0·2	0·6	1·8	11	11	0·5	10	..	..	..	..	8	32
0·6	..	..	25·6	0·4	0·1	0·3	0·5	1·4	8	14	<0·1	8	..	14	0·2	..	..	33
0·3	20	24	23·6	0·4	0·1	0·1	..	4·2	3	8	0·2	19	11	13	0·1	6	7	34
0·2	..	..	25·0	0·1	<0·1	0·2	0·2	2·7	3	3	0·3	12	..	6	0·1	..	..	35
0·5	40	2	26·2	0·4	<0·1	0·2	..	1·5	3	8	0·2	8	24	17	0·1	11	1	36
..	..	..	25·9	0·9	<0·1	0·4	..	1·1	30	30	0·3	8	..	..	..	..	..	37
·	..	37	26·3	0·3	0·1	0·3	0·3	1·0	30	3	0·6	7	..	..	..	..	10	38
..	10	..	27·0	0·1	<0·1	0·1	..	1·0	11	11	0·5	5	16	19	..	3	..	39
0·6	..	..	19·8	1·3	0·1	0·3	..	6·8	6	43	0·2	33	6	14	0·2	..	..	40
0·3	60	Trace	26·7	0·1	0·1	0·2	..	1·2	14	6	0·4	6	45	11	0·1	17	Trace.	41
..	..	3	26·5	0·3	<0·1	0·5	..	1·1	25	6	0·4	6	..	..	..	..	1	42
..	..	0	3·5	2·4	0·5	1·4	5·0	15·6	100	50	6·3	76	213	..	..	..	..	43
0·5	..	..	25·1	0·8	<0·1	0·2	0·4	1·8	17	11	0·6	11	11	23	0·1	..	..	44
..	..	..	26·2	0·5	<0·1	0·2	2	1·5	6	8	0·3	8	8	..	..	..	..	45
0·4		31	26·3	0·5	<0·1	0·2	..	1·3	6	11	0·7	8	91	20	0·1	17	9	46
0·5	40	43	25·8	0·1	0·1	0·2	..	2·1	8	11	0·1	10	Trace	11	0·1	11	12	47
..	..	18	26·9	0·1	<0·1	0·1	..	1·2	3	8	0·2	6	Trace	..	..	..	5	48
Oil Seeds																		
2·5	..	0	1·5	5·9	16·7	0·8	0·5	3·0	65	140	1·0	186	Trace	68	0·7	..	..	1
2·1	100	0	1·7	6·0	13·3	0·7	0·4	6·3	14	130	1·4	169	28	179	0·6	54	..	2
0·3	100	1	10·3	1·4	11·8	0·3	1·0	3·7	3	68	0·5	126	Trace	13	0·2	28	Trace	3
4·4	..	0	1·4	5·2	12·2	1·5	0·8	7·1	410	160	3·0	160	28	287	1·3	..	..	4

Serial number	Name of foodstuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100 g.	Carotene (International Vitamin A units per 100 g.)	Vitamin B_1 (Aneurin) per 100 g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Nuts and													
5	Groundnut .	Arachis hypogea.	7·9	26·7	40·1	1·9	3·1	20·3	0·05	0·39	1·6	549	63	900
6	Groundnut, roasted.	Do.	4·0	31·5	39·8	2·3	3·1	19·3	0·05	0·44	0·3	561	..	..
7	Linseed seeds	Linumusitatissimum.	6·5	20·3	37·1	2·4	4·8	28·8	0·17	0·37	2·7	530	50	..
8	Mustard seeds	Brassica campestris.	8·5	22·0	39·7	4·2	1·8	23·8	0·49	0·70	17·9	541	270	650
9	Oyster nut .	Telfairea pedata.	4·4	29·7	63·3	2·6	..	..	<0·01	0·57	4·1	689	..	..
10	Pistachio nut	Pistacia vera	5·6	19·8	53·5	2·8	2·1	16·2	0·14	0·43	13·7	626	240	670
11	Walnut .	Juglans regia.	4·5	15·6	64·5	1·8	2·6	11·0	0·10	0·38	4·8	687	10	450
	Condiments,													
1	"Aristhippili"	Piper clusii	12·5	13·2	4·7	6·0	5·2	58·4	0·46	0·28	13·5	329	..	..
2	Asafoetida .	Ferula foetida.	16·0	4·0	1·1	7·0	4·1	67·8	0·69	0·05	22·2	297	..	..
3	Cardamom .	Elettaria cardamomum.	20·0	10·2	2·2	5·4	20·1	42·1	0·13	0·16	5·0	229	..	..
4	Chillies, green	Capsicum frutescens.	82·6	2·9	0·6	1·0	6·8	6·1	0·03	0·08	1·2	41	454	..
5	Chillies, dry .	Do.	10·0	15·9	6·2	6·1	30·2	31·6	0·16	0·37	2·3	246	576	..
6	Cloves, dry .	Syzygium aromaticum	23·3	5·2	8·9	5·2	9·5	47·9	0·74	0·10	4·9	293	..	..
7	Cloves, green.	Do.	65·5	2·3	5·9	2·2	..	24·1	0·31	0·04	2·1	159	120	..
8	Coriander .	Coriandrum sativum.	11·2	14·1	16·1	4·4	32·6	21·6	0·63	0·37	17·9	288	1,570	..
9	Cumin .	Cuminum cyminum.	11·9	18·7	15·0	5·8	12·0	36·6	1·08	0·49	31·0	356	870	..
10	Fenugreek seeds	Trigonella foenum-graecum.	13·7	26·2	5·8	3·0	7·2	44·1	0·16	0·37	14·1	333	160	..
11	Garlic . .	Allium sativum.	62·8	6·3	0·1	1·0	0·8	29·0	0·03	0·31	1·3	142	0	..
12	Ginger . .	Zingiber officinale.	80·9	2·3	0·9	1·2	2·4	12·3	0·02	0·06	2·6	67	67	..
13	"Kandanthippilli".	Piper roxburghii.	12·2	6·4	2·3	4·8	8·5	65·8	1·23	0·19	62·1	310	..	..

Fats and oils of vegetable origin derived from oilseeds, etc., are in general devoid of carotene and vitamin A. Red palm oil is an exception (*see* p. 3).

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin μg. per 100 g.	Vitamin C mg. per 100 g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Oil Seeds—contd.																		
14·1	300	0	2·2	7·6	11·3	0·5	0·9	5·8	14	110	0·5	156	18	256	4·0	85	..	5
..	..	..	1·1	8·9	11·3	0·7	0·9	5·5	14	120	0·1	159	..	..	..	..	..	6
..	..	0	1·9	5·8	10·5	0·7	1·4	8·2	48	100	0·8	151	14	..	..	..	..	7
4·0	..	Trace	2·4	6·2	11·2	1·2	0·5	6·7	140	200	5·1	151	77	125	1·1	..	Trace.	8
..	..	..	1·2	8·4	17·9	0·7	..	..	3	160	1·2	196	..	..	..	..	..	9
1·4	..	0	1·6	5·6	15·1	0·8	0·6	4·6	40	120	3·9	178	68	190	0·4	..	..	10
1·6	..	0	1·3	4·4	18·3	0·5	0·7	3·1	30	110	1·1	195	3	128	0·5	..	..	11
Spices, etc.																		
..	..	0	3·6	3·7	1·3	1·7	1·5	16·5	130	80	3·8	93	..	..	..	..	..	1
..	..	0	4·5	1·1	0·3	2·0	1·2	19.2	190	14	6·3	84	..	..	..	..	..	2
..	..	0	5·7	2·9	0·6	1·5	5·7	11.9	37	150	1·4	65	..	..	..	..	..	3
0·5	130	111	23·4	0·8	0·2	0·3	1·9	1·7	3	23	0·3	12	128	..	0·1	51	31	4
..	..	50	2·8	4·5	1·8	1·7	8·6	9·0	45	100	0·7	70	16	..	..	..	14	5
..	..	0	6·6	1·5	2·5	1·5	2·7	13·6	210	30	1·4	83	..	..	..	..	..	6
..	..	..	18·6	0·7	1·7	0·6	..	6·8	88	11	0·6	45	34	..	..	..	..	7
1·1	350	Trace	3·2	4·0	4·6	1·2	9·3	6·1	180	100	5·1	82	445	..	0·3	99	Trace.	8
2·6	..	3	3·4	5·3	4·3	1·6	3·4	10·3	300	140	8·8	101	247	..	0·7	..	1	9
1·1	..	0	3·9	7·4	1·6	0·9	2·0	12·5	45	100	4·0	95	45	..	0·3	..	..	10
0·4	..	13	17·8	1·8	<0·1	0·3	0·2	8·2	8	90	0·4	40	..	..	0·1	..	4	11
6·6	..	6	22·9	0·7	0·3	0·3	0·7	3·5	6	17	0·7	19	19	..	0·2	..	2	12
..	..	0	3·5	1·8	0·7	1·4	2·4	18·6	350	54	17·6	88		..	..	..	..	13

Fats and oils of vegetable origin derived from oilseeds, etc., are in general devoid of carotene and vitamin A. Red palm oil is an exception (*see* p. 3).

Serial number	Name of food-stuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100 g.	Carotene (International Vitamin A units per 100 g.)	Vitamin B_1 µg. per 100 g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Condiments,
14	Lime peel	Citrus medica var acida.	66·5	1·8	0·5	1·8	..	29·4	0·71	0·06	2·7	129	..	..
15	Mace	Myristica fragrans.	15·9	6·5	24·4	1·6	3·8	47·8	0·18	0·10	12·6	437	..	..
16	Mustard	Brassica juncea.	8·5	22·0	39·7	4·2	1·8	23·8	0·49	0·70	17·9	541	270	..
17	Nutmeg	Myristica Fragrans.	14·3	7·5	36·4	1·7	11·6	28·5	0·12	0·24	4·6	472	Trace	..
18	Nutmeg, rind	Do.	86·8	1·0	0·4	0·6	..	11·2	0·04	0·01	2·0	52	8	..
19	Omum	Trachyspermum ammi	8·9	15·4	18·1	7·1	11·9	38·6	1·42	0·30	14·6	379	..	..
20	Pepper, green	Piper nigrum	63·4	4·8	2·7	1·8	..	27·3	0·27	0·07	2·4	153	680	..
21	Pepper, dry	Do.	12·9	11·5	6·8	4·4	14·9	49·5	0·46	0·20	16·8	305	..	..
22	Tamarind, pulp.	Tamarindus indica.	20·9	3·1	0·1	2·9	5·6	67·4	0·17	0·11	10·9	283	100	..
23	Turmeric	Curcuma domestica.	13·1	6·3	5·1	3·5	2·6	69·4	0·15	0·28	18·6	349	50	..
														Fru
1	Apple	Malus sylvestrius.	85·9	0·3	0·1	0·3	..	13·4	<0·01	0·02	1·7	56	Trace	120
2	Banana	Musa paradisiaca.	61·4	1·3	0·2	0·7	..	36·4	<0·01	0·05	0·4	153	Trace	150
3	Bilimbi	Averrhoa bilimbi.	93·9	0·5	0·2	0·2	0·4	4·8	<0·01	0·01	0·6	23	240	..
4	Bread fruit	Artocarpus altilis.	79·5	1·5	0·2	0·9	..	17·9	0·04	0·03	0·5	79	15	..
5	Bullock's heart	Anona reticulata.	76·8	1·4	0·2	0·7	..	20·9	0·01	0·01	0·6	91	Trace	..
6	Cape gooseberry.	Physalis peruviana.	82·7	1·3	0·2	0·6	3·2	11·5	0·01	0·06	1·8	55	..	..
7	Cashew fruit	Anacardium occidentale	87·9	0·2	0·1	0·3	..	11·6	0·01	0·01	0·2	48	..	..
8	Dates (Persian).	Phoenix dactylifera	20·1	2·0	0·3	1·5	2·1	67·3	0·07	0·08	10·6	283	600	90
9	Durain, ripe	Durio zibethinus.	69·0	2·5	3·5	1·2	..	34·1	<0·01	0·05	1·0	183	20	..
10	Figs	Ficus carica	80·8	1·3	0·2	0·8	..	17·1	0·06	0·03	1·2	74	270	..
11	Grapes (Blue variety)	Vitis labruscana vinifera.	85·5	0·8	0·4	0·4	3·0	10·2	0·03	0·02	0·4	45	15	40

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin μg. per 100 g.	Vitamin C mg. per 100 g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P) mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Spices, etc.—contd.																		
..	..	..	18·8	0·5	0·1	0·5	..	8·3	200	17	0·8	37	..	..	..	..	..	14
..	..	0	4·5	1·8	6·9	0·5	1·1	13·5	50	30	3·6	124	..	..	..	..	..	15
4·0	75	Trace	2·4	6·2	11·2	1·2	0·5	6·7	140	200	5·1	154	77	..	1·1	21	Trace	16
..	..	0	4·1	2·1	10·3	0·5	3·3	8·1	34	68	1·3	134	Trace	..	..	..	..	17
..	..	..	24·6	0·3	0·1	0·2	..	3·2	11	3	0·6	15	2	..	..	..	..	18
..	..	..	2·5	4·4	5·1	2·0	3·4	10·9	400	85	4·1	108	..	..	..	..	..	19
0·2	..	..	18·0	1·4	0·8	0·5	..	7·7	70	20	0·7	43	193	..	0·1	..	..	20
1·4	..	..	3·7	3·3	1·9	1·2	4·2	14·0	130	57	4·8	87	..	..	0·4	..	..	21
0·7	..	3	5·9	0·9	<0·1	0·8	1·6	19·1	48	31	3·1	82	28	..	0·2	..	1	22
2·3	Trace	0	3·7	1·8	1·4	1·0	0·7	19·7	43	80	5·3	99	14	..	0.7	Tra-ce	..	23
its																		
0·2	30	2	24·3	0·1	<0·1	0·1	..	3·8	3	6	0·5	16	Trace	33	0·1	9	1	1
0·3	30	1	17·4	0·4	0·1	0·2	..	10·3	3	14	0·1	43	Trace	43	0·1	9	<1	2
..	..	..	27·6	0·1	0·1	0·1	0·1	1·4	3	3	0·1	7	68	..	..	..	..	3
..	..	..	22·5	0·4	0·1	0·3	..	5·1	11	8	0·1	22	4	..	..	..	..	4
..	..	..	21·8	0·[illegible]	0·1	0·2	..	5·9	3	3	0·2	26	Trace	..	..	..	..	5
..	..	49	23·4	0·5	0·1	0·2	0·9	3·3	3	17	0·5	16	..	..	..	..	14	6
..	..	..	24·9	0·1	<0·1	0·1	..	3·3	3	3	0·1	14	..	..	..	..	..	7
0·8	30	Trace	7·4	0·9	0·1	0·4	0·6	19·1	20	23	3·0	80	170	26	0·2	9	Trace	8
..	..	..	16·4	0·8	1·1	0·3	..	9·7	3	14	0·3	52	6	..	..	..	.	9
0·6	50	2	25·5	0·4	0·1	0·2	..	4·8	17	8	0·3	21	77	..	0·2	14	1	10
0·3	10	3	24·2	0·2	<0·1	0·1	0·9	2·9	8	6	0·1	13	4	11	0·1	3	1	11

Serial number	Name of foodstuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100g.	Carotene (International Vitamin A units per 100 g.)	Vitamin B_1 μg. per 100 g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Fru
12	Grape fruit (Triumph).	Citrus paradisi.	92·0	0·7	0·1	0·2	..	7·1	0·02	0·02	0·2	32	..	120
13	Grape fruit (Marsh's seedless).	Do.	88·5	1·0	0·1	0·4	..	10·0	0·03	0·03	0·2	45	..	
14	Guava, country.	Psidium guajava.	76·1	1·5	0·2	0·8	6·9	14·5	0·01	0·04	1·0	66	Trace	30
15	Guava, hill .	Psidium cattelianum.	85·3	0·1	0·2	0·6	4·8	8·1	0·05	0·02	1·2	38	Trace	..
16	Jack fruit .	Artocarpus heterophyllus.	77·2	1·9	0·1	0·8	1·1	18·9	0·02	0·03	0·5	84	540	30
17	Jambu fruit .	Syzigium Cuminii.	78·2	0·7	0·1	0·4	0·9	19·7	0·02	0·01	1·0	83	..	..
18	"Karwanda," dry.	Carrisa carandas.	18·2	2·3	0·6	2·8	..	67·1	0·16	0·06	39·1	364	..	..
19	"Kila pazham" (small).	Vaccinium Leschenaulta.	79·5	0·8	0·6	0·3	7·3	11·5	0·02	0·01	1·4	55	80	..
20	"Korukkapalli".	Pithecolobium dulce	80·8	2·6	0·3	0·4	..	15·9	0·01	0·04	0·4	77	..	..
21	Lemon	Citrus limon.	85·0	1·0	0·9	0·5	1·7	11·1	0·07	0·01	2·3	57	Trace	20 (Juice)
22	Lime .	Citrus aurantifolia.	84·6	1·5	1·0	0·7	1·3	10·9	0·09	0·02	0·3	59	26	20 (Juice)
23	Loquat .	Eriobotrya japonica.	87·4	0·7	0·3	0·5	0·9	10·2	0·03	0·02	0·7	46	..	..
24	Mango, green	Mangifera indica.	90·0	0·7	0·1	0·4	..	8·8	0·01	0·02	4·5	39	150	
25	Mango, ripe .	Do.	80·1	0·6	0·1	0·3	1·1	11·8	0·01	0·02	0·3	50	4,800	40
26	Mango, "Ankola".	Do.	85·9	1·0	0·1	0·5	..	12·5	<0·01	0·02	0·5	55	1,860	..
27	Mangosteen .	Garcinia mangostana.	84·0	0·5	0·1	0·2	..	14·3	0·01	0·02	0·2	60	..	..
28	Melon, water	Citrullus vulgaris.	95·7	0·1	0·2	0·2	..	3·8	<0·01	0·01	0·2	17	Trace	20
29	Orange	Citrus aurantium.	87·8	0·9	0·3	0·4	..	10·6	0·05	0·02	0·1	49	350	120

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin μg. per 100 g.	Vitamin C mg. per 100 g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	1	1	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	4
its.—contd.																		
0·3	20	31 (Juice)	26·1	0·2	<0·1	0·1	..	2·0	6	6	0·1	9	..	34	0·1	6	9 (Juice	12
		..	25·1	0·3	<0·1	0·1	..	2·8	8	8	0·1	13	..					13
0·2	30	299	17·3	0·4	0·1	0·2	2·0	4·1	3	11	0·3	19	Trace	8	0·1	9	85	14
0·3	..	15	24·2	<0·1	0·1	0·2	1·4	2·3	14	6	0·3	11	Trace	..	0·1	..	4	15
0·4	..	10	21·9	0·5	<0·1	0·2	0·3	5·4	6	8	0·1	4	153	8	0·1	..	3	16
..	..	..	22·2	0·2	<0·1	0·1	0·3	5·6	6	3	0·3	24	..	..	..	..	..	17
..	..	..	5·2	0·7	2·7	0·8	..	19·0	45	17	11·1	103	..	..	..	..	..	18
..	..	..	22·5	0·2	0·2	0·1	2·1	3·3	6	3	0·4	16	23	..	..	..	..	19
..	..	..	22·9	0·7	0·1	0·1	..	4·5	3	11	0·1	22	..	..	..	..	..	20
0·1 Juice)	4	39 (Juice)	24·1	0·3	0·3	0·1	0·5	3·1	20	3	0·7	16	Trace	6	<0·1	1	11 (Juice	21
0·1 (Juice)	..	63 (Juice)	24·0	0·4	0·3	0·2	0·4	3·1	25	6	0·1	17	7	6	<0·1	..	18 (Juice	22
..	..	..	24·8	0·2	0·1	0·1	0·3	2·9	8	6	0·2	13	..	..	..	..	..	23
..	30	3	25·5	0·2	<0·1	0·1	..	2·5	3	6	1·3	11	43	..	..	9	1	24
0·3	50	13	24·4	0·2	<0·1	0·1	0·3	3·3	3	6	0·1	14	1363	11	0·1	14	4	25
..	..	24	24·3	0·3	<0·1	0·1	..	3·6	3	6	0·1	16	528	..	..	..	7	26
..	..	..	24·1	0·1	<0·1	0·1	..	4·1	3	6	0·1	17	..	..	..	..	..	27
0·2	..	1	27·1	0·1	0·1	0·1	..	1·1	3	3	0·1	5	Trace	6	0·1	..	<1	28
0·3 ice	60	68	24·9	0·3	0·1	0·1	..	3·1	14	6	<0·1	14	99	34	..	17	19	29

Serial number 1	Name o foodstuff 2	Botanical name 3	Moisture % 4	Protein % 5	Fat (Ether extractives less % 6	Mineral matter % 7	Fibre % 8	Carbohydrate % 9	Calcium (Ca) % 10	Phosphorus (P) 11	Iron (Fe) mg. % 12	Calorific value per 100. g. 13	Carotene (International Vitamin A units per 100 g.) 14	Vitamin B, per 100 g. 15
														Fru
30	Orange, Washington Naval.	Citrus aurantium.	89·8	0·7	0·1	0·3	..	9·1	0·02	0·02	0·2	40	..	..
31	Orange, Jaffa	Do.	90·8	0·6	0·1	0·3	..	8·2	0·02	0·20	0·2	36	..	..
32	Palmyra fruit, tender.	Borassus flabellifer	92·7	0·6	<0·1	0·2	..	6·5	<0·01	0·02	0·5	28	..	..
33	"Pannir koyya" or Rose apple.	Syzygium jambos.	89·1	0·7	0·2	0·3	..	9·7	0·01	0·03	0·5	43	..	.
34	Papayya, ripe	Carica papaya.	89·6	0·5	0·1	0·4	..	9·5	0·01	0·01	0·4	40	2,020	40
35	Passion fruit	Passiflora edulis.	76·3	0·9	0·1	0·7	..	22·0	<0·01	0·06	2·0	93	90	.
36	Peaches .	Amygdalis persica.	90·1	1·5	0·2	0·6	..	7·6	0·01	0·03	1·7	38	Trace	20
37	Pears, country	Prunus persica.	86·9	0·2	0·1	0·3	1·0	11·5	0·01	0·01	0·7	47	14	20
38	Pears, English	Pyrus Achras.	85·8	0·9	0·2	0·2	..	12·9	0·01	0·02	0·8	57	80	90
39	Pears, avocado or Butter fruit	Persea americana.	73·6	1·7	22·8	1·1	..	0·8	0·01	0·08	0·7	215	..	..
40	Persimmon .	Diospyros kaka.	79·6	0·8	0·2	0·4	..	19·0	0·01	0·01	0·3	81	1,710	..
41	Pine apple .	Ananas comosus.	86·5	0·6	<0·1	0·5	0·3	12·0	0·02	0·01	0·9	50	60	..
42	Plantain (ordinary).	Musa paradisiaca.	73·4	1·1	0·1	0·7	..	24·7	0·01	0·03	0·5	104	124	50
43	Plantain, hill "Anaikombu"	Do.	79·9	1·2	0·1	0·8	..	18·0	0·01	0·03	0·3	78	124	
44	Plantain (red variety)	Musa rubrum;	74·1	1·6	0·1	0·8	..	23·4	0·01	0·02	0·6	101	350	

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin μg. per 100 g.	Vitamin C mg. per 100 g.	Values per Ounce. Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, less g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
its.—contd.																		
..	..	..	25·5	0·2	<0·1	0·1	..	2·6	6	6	0·1	11	..	..	..	..	..	30
..	..	..	25·7	0·2	<0·1	0·1	..	2·3	6	6	0·1	10	..	..	..	..	..	31
..	..	4	26·3	0·2	<0·1	0·1	..	1·8	3	6	0·1	8	..	..	..	..	1	32
..	50	..	25·3	0·2	0·1	0·1	..	2·7	3	8	0·1	12	..	..	..	14	..	33
0·2	250	46	25·4	0·1	<0·1	0·1	..	2·7	3	3	0·1	11	573	11	0·1	71	13	34
..	..	..	21·6	0·3	<0·1	0·2	..	6·2	3	17	0·6	26	25	..	..	..	..	35
0·2	1	1	25·6	0·4	0·1	0·2	..	2·1	3	3	0·5	11	Trace	6	0·1	3	<1	36
0·2	30	Trace	24·7	0·1	<0·1	0·1	0·3	3·3	3	3	0·2	13	4	6	0·1	9	Trace	37
0·2	..	..	24·3	0·3	0·1	0·1	..	3·7	3	6	0·2	16	23	26	0·1	..	..	38
..	..	13	20·9	0·5	6·8	0·3	..	0·2	3	23	0·2	61	..	..	..	..	1	39
..	..	..	22·6	0·2	0·1	0·1	..	5·4	3	3	0·1	23	485	..	..	..	..	40
..	120	63	24·5	0·2	<0·1	0·1	0·1	3·4	6	3	0·3	14	17	..	..	34	18	41
0·3	170	6	20·3	0·3	<0·1	0·2	..	7·0	3	8	0.1	30	35	14	0·1	48	2	42
..	..	9	22·6	0·3	<0·1	0·2	..	5·1	3	8	0·1	22	35	..	..	..	3	43
..	..	..	21·0	0·5	<0·1	0·2	..	6·6	3	6	0·2	29	99	..	..	..	..	44

Serial number	Name of foodstuff	Botanical name	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate, %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100 g.	Carotene (International Vitamin A units per 100 g.)	Vitamin B$_1$ µg. per 100 g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Fru
45	Plums (red variety).	Prunus domestica.	89·8	0·7	0·2	0·4	..	8·9	0·02	0·02	0·5	40	230	120
46	Pomegranate	Punica granatum.	78·0	1·6	<0·1	0·7	5·1	14·6	0·01	0·07	0·3	65	0	..
47	Pomeloe .	Citrus maxima.	88·0	0·6	<0·1	0·5	0·6	10·2	0·03	0·03	0·1	44	200	30
48	Quince .	Cydonia oblonga.	85·7	0·3	<0·1	0·3	1·7	11·9	0·01	0·02	0·4	49	..	..
49	Radish fruit .	Raphanus sativus.	91·2	2·3	0·3	0·8	..	5·4	0·08	0·10	2·8	34	..	..
50	Raisins (preserved).	Vitis vinifera.	18·5	2·0	0·2	2·0	..	77·3	0·10	0·08	4·0	319	0	60
51	"Seetha Pazham" or custard apple	Anona squamosa.	73·5	1·6	0·3	0·7	..	23·9	0·02	0·04	1·0	105	Trace	..
52	Strawberry	Fragaria vesca.	87·8	0·7	0·2	0·4	1·1	9·8	0·03	0·03	1·8	44	..	30
53	"Thavittu Pazham".	Rhodomyrtus tomentosa.	83·9	0·6	0·2	0·4	..	14·9	0·04	0·02	1·2	64	74	.
54	Tomato, ripe	Lycopersicum esculentum.	94·5	1·0	0·1	0·5	..	3·9	0·01	0·02	0·1	21	320	120
55	Tree tomato	Cyphomandra betacea.	82·7	1·5	0·2	1·1	4·2	10·3	0·01	0·03	0·7	49	540	..
56	"Vikki Pazham" or wild olive.	Eleocarpus oblongus.	63·9	1·4	0·1	0·9	..	33·7	0·01	0·02	2·0	141	..	.
57	Wood apple .	Limonia acidissima.	69·5	2·3	0·6	1·9	5·2	15·5	0·13	0·11	0·6	97	..	..
58	Tamarind, pulp.	Tamarindus indicus.	20·9	3·1	0·1	2·9	5·6	67·4	0·17	0·11	10·9	283	100	60
59	Zizyphus .	Zizyphus mauritiana.	83·9	0·8	0·1	0·4	..	12·8	0·03	0·03	0·8	55	70	..

FOOD VALUES—contd.

Nicotinic acid mg. per 100 g.	Riboflavin μg. per 100 g.	Vitamin C mg. per 100 g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Carotene (International Vitamin A Units)	Vitamin B_1 mg.	Nicotinic acid, μg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
its.—concld.																		
0·3	30	1	25·5	0·2	0·1	0·1	..	2·5	6	6	0·1	11	65	34	0·1	9	<1	45
..	100	16	22·1	0·5	<0·1	0·2	0·1	4·1	3	20	0·1	18	..	..	..	28	5	46
0·2	..	20	24·9	0·2	<0·1	0·1	0·2	2·9	8	8	<0·1	12	57	8	0·1	..	6	47
..	..	10	24·3	0·1	<0·1	0·1	0·5	3·4	3	6	0·1	14	..	..	..	..	3	48
..	..	..	25·9	0·7	0·1	0·2	..	1·5	20	28	0·8	10	..	..	..	..	..	49
0·5	..	Trace	5·2	0·6	0·1	0·6	..	21·9	30	23	1·1	91	..	17	0·1	..	Trace	50
..	..	..	20·8	0·5	0·1	0·2	..	6·8	6	11	<0·1	30	Trace	..	..	..	..	51
0·2	..	52	24·9	0·2	0·1	0·1	0·3	2·8	8	8	0·5	12	..	8	0·1	..	15	52
..	..	..	23·8	0·2	0·1	0·1	..	4·2	11	6	0·3	18	21	..	..	..	..	53
0·4	60	32	26·8	0·3	<0·1	0·1	..	1·1	3	6	<0·1	6	91	34	0·1	17	9	54
..	..	Trace	23·4	0·4	0·1	0·3	1·2	2·9	3	8	0·2	14	153	..	..	..	Trace	55
..	..	..	18·1	0·4	<0·1	0·3	..	9·6	3	6	0·6	40	..	..	..	..	..	56
..	170	..	19·7	2·1	0·2	0·5	1·5	4·4	37	31	0·2	28	..	..	..	48	..	57
0·7	..	3	5·9	0·9	<0·1	0·8	1·6	19·1	48	31	3·1	82	28	17	0·2	..	1	58
..	..	..	24·3	0·2	<0·1	0·1	..	3·6	8	8	0·2	16	20	..	..	..	..	59

Serial number	Name of food-stuff	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100 g.	Vitamin A (International units per 100 g.)	Carotene (International Vitamin A units per 100 g.)	Vitamin B_1 µg. per 100 g.	Nicotinic acid mg. per 100 g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
															Flesh
1	Beef (muscle)	74·3	22·6	2·6	1·0	..	..	0·01	0·19	0·8	114	..	Trace	150	6·4
2	Crab (muscle)	83·5	8·9	1·1	3·2	..	3·4	1·37	0·15	21·2	59	Trace	1,300	..	3·1
3	Egg, duck	71·0	13·5	13·7	1·0	..	0·7	0·07	0·26	3·0	180	1,200	900	120	0·2
4	Egg, hen	73·7	13·3	11·3	1·0	..	..	0·06	0·22	2·1	173	1,200	1,000	130	0·1
5	Fish (Mangalore, big fish)	76·4	22·6	0·6	0·8	..	..	0·02	0·19	0·9	91				
6	Fish (Mangalore, small fish).	77·0	21·5	1·6	2·0	..	..	0·06	0·41	2·3	100	26	9·0	100	1·0 to 3·9
7	Fish "Vajra"	79·1	19·9	1·5	1·4	..	..	0·04	0·38	0·7	93				
8	Liver, sheep	70·4	19·3	7·5	1·5	..	1·4	0·01	0·38	6·3	150	22,500	0	360	17·6
9	Mutton (muscle)	71·5	18·5	13·3	1·3	..	..	0·15	0·15	2·5	164	31	Trace	150	6·2
10	Pork (muscle)	77·4	18·7	4·4	1·0	..	..	0·03	0·20	2·3	114	Trace	Trace	540	2·8
11	Prawn (muscle)	77·9	20·8	0·3	1·4	..	..	0·09	0·24	0·8	86	Trace	Trace	<80	4·8
12	Snail—small (Viviparus bengalensis typica).	78·9	12·6	1·6	3·8	..	3·7	1·3	0·15	..	74	..	..	..	..
13	Snail—big. (Pitta Globosa)	74·1	10·5	0·6	2·4	..	12·4	0·87	0·12	..	97	..	..	..	..
14	Duck (Anas platyrhyncha.)	72·3	21·6	1·3	1·2	..	..	<0·01	0·24	..	130	..	..	..	..
15	Pigeon (Columba Livia intermedia).	70·1	23·3	4·9	1·4	..	..	0·01	0·29	..	138	..	..	..	..
16	Fowl (Gallus bankiva murghi).	72·2	25·9	0·6	1·3	..	..	0·03	0·25	..	109	..	..	..	..
17	Kajura (Lates calcrifer).	79·1	12·6	0·1	..	..	..	0·05	0·89	1·2	54	..	..	..	..
18	Surmal (Cybium kuhlii)	63·0	19·9	1·1	..	..	..	0·09	0·16	2·0	92	..	..	..	..
19	Ghol (scioena miles)	66·7	13·1	0·9	..	..	..	0·09	0·15	2·1	82	..	..	..	..
20	Singhada (Arius dussumieri).	61·0	20·9	3·1	..	..	..	0·10	0·15	1·8	111	..	..	..	..
21	Rangoli	66·6	15·9	1·2	..	..	..	0·07	0·11	1·9	78	..	..	..	..
22	Shark	72·8	21·9	..	..	..	..	0·01	0·27	..	87	..	..	..	2·5
23	Cat Fish (Siluridae)	77·1	19·1	..	..	..	..	0·01	0·23	..	86	..	..	..	2·5
24	Pomfrets (Stromateus)	76·5	19·1	..	..	..	..	0·20	0·29	0·9	76	..	..	..	2·6
25	Sardines (Sardinella fimbriata)	72·1	21·0	..	..	..	..	0·09	0·36	2·5	84	..	..	..	2·6

FOOD VALUES—contd.

Riboflavin μg. per 100 g.	Vitamin C mg. per 100 g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives) g	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Vitamin A (International Units)	Carotene (International Vitamin A Units)	Vitamin B_1 μg.	Nicotinic acid, mg.	Riboflavin, μg.	Vitamin C, mg.	Serial number
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Foods																		
40	2	21·1	6·4	0·7	0·3	..	..	3	54	0·2	32	17	Trace	43	1·8	11	1	1
..	..	23·7	2·5	0·3	0·9	..	1·0	389	43	6·0	17	Trace	369	..	0·9	..	..	2
..	..	20·1	3·8	3·9	0·3	..	0·2	20	74	0·9	51	340	255	34	<0·1	..	..	3
..	..	20·9	3·8	3·8	0·3	..	..	17	62	0·6	49	340	284	37	<0·1	..	..	4
..	..	22·2	6·4	0·2	0·2	..	..	6	54	0·3	26							5
..	..	22·1	6·1	0·5	0·6	..	..	17	120	0·7	28	7	3	28	0·3 to 1·1	..	..	6
..	..	22·5	5·7	0·4	0·4	..	..	11	110	0·2	26							7
1,700	20	19·9	5·4	2·1	0·4	..	0·4	3	110	1·8	43	6,333	..	102	5·0	483	6	8
270	..	20·3	5·3	3·8	0·4	..	..	43	43	0·7	55	9	Trace	51	1·9	77	..	9
90	2	21·9	5·3	1·2	0·3	..	..	8	57	0·7	32	Trace	Trace	153	0·8	26	1	10
100	..	22·1	5·9	0·1	0·4	..	..	25	68	0·2	24	Trace	Trace	126	1·4	28	..	11
..	..	22·4	3·6	0·3	0·1	..	0·1	370	43	..	21	..	..	..	..	..	..	12
..	..	21·0	3·0	0·2	0·7	..	3·5	250	34	..	28	..	..	..	..	..	..	13
..	..	20·5	6·1	1·4	0·3	..	..	1	70	..	37	..	..	..	..	..	..	14
..	..	20·0	6·6	1·4	0·4	..	..	3	82	..	39	..	..	..	..	..	..	15
..	..	20·5	7·2	0·2	0·4	..	..	7	71	..	31	..	..	..	..	..	..	16
..	..	22·5	3·6	0·1	..	..	..	15	250	0·3	11	..	..	..	..	..		17
..	..	17·8	5·6	0·4	..	..	..	26	45	0·6	26	..	..	..	..	..	..	18
..	..	19·7	5·2	0·3	..	..	..	25	43	0·6	23	..	..	..	..	..	..	19
..	..	17·3	5·9	0·9	..	..	..	28	43	0·6	32	..	..	..	..	..	..	20
..	..	18·9	4·8	0·3	..	..	..	21	31	0·5	22	..	..	..	..	..	..	21
..	..	20·6	6·2	..	..	..	..	3	77	..	25	..	..	..	0·7	..	..	22
..	..	21·8	6·1	..	..	..	..	3	65	..	24	..	..	..	0·7	..	..	23
550	..	22·2	5·4	..	..	..	..	57	82	0·3	22	..	..	..	0·7	156	..	24
..	..	22·1	6·0	..	..	..	..	25	100	0·7	24	..	..	..	0·7	..	..	25

Serial number	Name of foodstuff	Moisture %	Protein %	Fat (Ether extractive) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100 g.	Vitamin A (International Units per 100 g.)	Carotene (International Vitamin A Units.)	Vitamin B_1 µg. per 100 g.	Nicotinic acid mg. per 100 g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
															Milk and
1	Milk, cow's	87·6	3·3	3·6	0·7	..	4·8	0·12	0·09	0·2	65	180	Trace	51	0·1
2	Milk, buffalo's	81·0	4·3	8·8	0·8	..	5·.	0·21	0·13	0·2	117	162	Trace	40	0·1
3	Milk, goat's	85·2	3·7	5·6	0·8	..	4·7	0·17	0·12	0·3	84	182	Trace	..	..
4	Milk, human	88 0	1·0	3·9	0·1	..	7·0	0·02	0·01	0·2	67	208	Trace	..	..
5	Curds	90·3	2·9	2·9	0·6	..	3·3	0·12	0·19	0·3	51	130	Trace	..	..
6	Butter-milk (Variety 3 described below),	97·5	0·8	1·1	0·1	..	0·5	0·03	0·03	0·8	15	Trace	0	..	..
7	Skimmed milk	92·1	2·5	0·1	0·7	..	4·6	0·12	0·09	0·2	29	..	..	..	0·1
8	Skimmed milk powder.	4·1	38·0	0·1	6·8	..	51·0	1·37	1·00	1·4	357	0	0	57	1·1
9	Cheese	40·3	24·1	25·1	4·2	..	6·3	0·79	0·52	2·1	348	273	..	..	..
10	"Koa" (whole buffalo milk).	30·6	14·6	31·2	3·1	..	20·5	0·65	0·42	5·8	421	..	..	..	..
11	"Koa" (skimmed buffalo milk).	46·1	22·3	1·6	4·3	..	25·7	0·99	0·65	2·7	206	..	..	..	..
															Miscellaneous
1	Arecanut (*Areca cathecu*)	31·3	4·9	4·4	1·0	11·2	47·2	0·05	0·13	1·5	248	0	5	..	..
2	Arrowroot flour (West Indian) (*Maranta arundinacea*).	16·5	0·2	0·1	0·1	..	83·1	0·01	0·02	1 0	334	0	..	..	..
3	Betel leaves (*Piper betle*).	85·4	3·1	0·8	2·3	2·3	6·1	0·23	0·04	5·7	44	0	9,600	70	0·7
4	Coconut, tender	90·8	0·9	1·4	0·6	..	6·3	0·01	0·03	0·9	40	..	..	..	..
	Coconut water	95·5	0·1	<0·1	0·4	..	4·0	0·02	<0·01	0·5	17	..	.	..	..
6	Cod liver oil	..	..	100·0	..	..	..		..	.	900·0	60,000 to 2,00,000	0	..	..
7	Halibut liver oil	..	..	100·0	..	..	..	..	..	..	900·0	39,000,00	0	..	..
8	Jaggery	3·9	0·4	0·1	0·6	..	95·0	0·08	0·04	11·4	383	0	280	20	1·0
9	"Kalipakku"	13·8	6·4	8·4	1·8	11·8	57·8	0·13	0·14	11·1	332	0	..	..	..
10	"Madapu ginja"	36·0	20·2	18·8	2·6	..	22·4	0·21	0·44	4·5	340	..		..	..
11	Mahua flowers	29·7	4·3	0·3	2·1	..	63·6	0·06	0·11	10·3	274	..	25	..	..
12	"Makhana"	12·8	9·7	0·1	0·5	..	76·9	0·02	0·09	1·4	348	..	Trace	..	..
13	"Neera"	..	0·4	..	0·5	..	10·9	Trace	0·14	<0·1	45	..	..	9 to 27	Trace
14	Malted palmyra root.	11·2	5·2	0·5	2·9	..	80·2	0·02	0·16	4·2	346	.	..	..	..
15	"Pappads"	20·3	18·8	0·3	8·2	..	52·4	0·08	0·30	17·2	288	0	Trace		..
16	"Perandai" (*Vitis quadrangulars*).	87·4	1·2	0·3	2·0	1·8	7·3	0·65	0·05	2·1	37	0	..	..	..

The term "butter-milk" is applied in India to the following product:

Whole milk, boiled, soured, the fat removed as far as possible by home-churning and diluted to suit individual needs and tastes.

FOOD VALUES—contd.

Riboflavin (µg. per 100 g.)	Vitamin C mg. per 100 g.	Values per Ounce: Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Vitamin A (International Units)	Carotene (International Vitamin A Units)	Vitamin B_1 µg.	Nicotinic acid, mg.	Riboflavin, µg.	Vitamin C, mg.	Serial number
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Milk Products																		
200	2	24·8	0·9	1·0	0·2	..	1·4	34	25	0·1	18	51	Trace	14	<0·1	57	1	1
..	..	23·0	1·2	2·5	0·	..	1·4	60	37	0·1	33	46	Trace	11	<0·1	..	..	2
40	..	24·1	1·1	1·6	0·2	..	1·4	48	34	0·1	24	52	Trace	..	..	11	..	3
30	..	24·9	0·3	1·1	<0·1	..	2·0	6	3	0·1	19	59	Trace	..	..	9	..	4
60	..	25·6	0·8	0·8	0·2	..	0·9	34	25	0·1	14	37	Trace	..	..	17	..	5
..	..	27·6	0·2	0·3	<0·1	..	0·1	8	8	0·2	4	Trace	0	..	..	..	..	6
..	1	26·1	0·7	<0·1	0·2	..	1·3	34	25	0·1	8	..	..	..	<0·1	..	<1	7
..	..	1·2	10·7	<0·1	1·9	..	14·4	390	280	0·4	101	0	0	16	0·3	..	..	8
..	..	11·4	6·8	7·1	1·2	..	1·8	220	150	0·6	99	77	..	..	..	..	..	9
..	0	8·7	4·1	8·9	0·9	..	5·8	180	120	1·6	120	..	..	..	..	..	0	10
..	0	13·0	6·3	0·5	1·2	..	7·3	280	180	0·8	59	..	..	..	..	..	0	11
Foodstuffs																		
..	..	8·9	1·4	1·2	0·3	3·2	13·4	14	37	0·4	70	..	1	..	..	..	..	1
..	..	4·7	0·6	0·3	<0·1	..	23·6	3	6	0·3	95	..	..	..	..	..	..	2
30	5	24·2	0·9	0·2	0·7	0·6	1·7	65	11	1·6	12	..	2,726	20	0·2	9	1	3
..	2	25·7	0·3	0·4	0·2	..	1·8	3	8	0·3	11	..	..	..	..	..	1	4
..	2	27·1	<0·1	<0·1	0·1	..	1·1	6	<3	0·1	5	..	..	..	..	..	1	5
..	0	..	..	28·4	..	..	..	..	..	..	256	7,040 to 56,800	..	..	..	..	..	6
..	0	..	..	28·4	..	..	..	..	..	..	256	1,107, 600	..	..	..	..	..	7
..	0	1·1	0·1	<0·1	0·2	..	27·0	23	11	3·2	109	..	79	6	0·3	..	..	8
..	..	3·9	1·8	2·4	0·5	3·4	16·4	37	40	3·2	94	..	..	..	..	..	..	9
..	..	10·2	5·7	5	0·7	..	6·4	60	120	1·3	97	..	..	..	..	..	..	10
..	..	8·4	1·2	0·1	0·1	..	18·1	17	31	2·9	78	..	7	..	..	..	..	11
..	..	3·6	2·3	<0·1	0·1	..	21·8	6	25	0·4	99	..	Trace	..	..	..	..	12
Trace	13·3	..	0·1	..	0·1	..	3·1	Trace	40	<0·1	13	..	..	3 to 8	Trace	Trace	4	13
..	..	3·2	1·5	0·1	0·8	..	22·7	6	45	1·2	98	..	..	..	..		..	
..	0	5·8	5·3	0·1	2·3	..	14·8	23	80	4·9	82	..	Trace	..	..	..	..	
..	..	24·8	0·3	0·1	0·6	0·5	2·1	180	14	0·6	11	..	..	..	..	..	..	

Serial number	Name of foodstuff	Moisture %	Protein %	Fat (Ether extractives) %	Mineral matter %	Fibre %	Carbohydrate %	Calcium (Ca) %	Phosphorus (P) %	Iron (Fe) mg. %	Calorific value per 100 g.	Carotene (International Vitamin A Units per 100 g.)	Vitamin B_1 μg. per 100 g.	Nicotinic acid mg. per 100g.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
														Miscellaneous
17	Rajghiro (*Amaranthus paniculatus*)	8·9	15·4	5·3	2·7	2·0	65·7	0·22	0·65	..	372	..	..	..
18	Red Palm oil (*Elaies guineensis*).	.	..	100·0	..	..	..	..	..	..	900	40,000 to 50,000	..	..
19	Sago (*Meotrxylon sago*).	12·2	0·2	0·2	0·3	..	87·1	0·01	0·01	1·3	351	0	10	0·2
20	"Singhara", dry (*Trappa bispinosa*).	13·8	13·4	0·8	3·1	..	68·9	0·07	0·44	2·4	336	Trace	..	..
21	Sugar cane juice	90·2	0·1	0·2	0·4	..	9·1	0·01	0·01	1·1	39	10	..	..
22	Sugar cane preserves.	8·1	0·6	0·1	1·8	11·0	78·4	0·02	0·06	14·3	317	..	..	..
23	Sugar cane (same cane as for above preserves).	75·8	0·1	0·1	0·5	3·0	20·5	<0·01	0·02	0·3	83	..	..	..
24	Toddy, sweet .	84·7	0·1	0·2	0·7	..	14·3	0·15	0·01	0·3	59	0	..	..
25	Toddy sweet (coconut).	96·2	0·1	<0·1	0·2	..	3·5	0·04	0·01	1·0	15	0		.
26	Toddy, fermented (coconut).	98·3	0·2	0·2	0·1	..	1·3	0·1	0·01	1·3	7	0	<15	..
27	Toddy fermented (obtained from a shop).	97·6	0·1	0·3	0·2	..	1·8	<0·01	0·01	1·1	10	0		..
28	Yeast, dried (Brewer's).	13·6	39·5	0·6	7·0	0·2	39·1	0·44	1·49	43·7	320	110	6,000	40·0
29	Yeast, dried (food).	7·8	35·7	1·8	8·4	..	46·3	0·16	2·09	21·5	344	..	3,200	27·0

Honey contains about 80 per cent. of sugars, principally fructose and glucose. It may contain little vitamin C but no other Vitamins.

FOOD VALUES—concld.

Riboflavin µg. per 100 g.	Values per Ounce															
	Moisture, g.	Protein, g.	Fat (Ether extractives), g.	Mineral matter, g.	Fibre, g.	Carbohydrate, g.	Calcium (Ca), mg.	Phosphorus (P), mg.	Iron (Fe), mg.	Calorific value	Vitamin A (International Units)	Carotene (International Vitamin A Units)	Vitamin B_1 µg.	Nicotinic acid, mg.	Riboflavin, µg.	Vitamin C, mg.	Serial number
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Food stuffs.—contd.																	
..	2·5	4·4	1·5	0·8	0·6	18·7	63	185	..	106	..	..	..	..	..	..	17
..	..	..	28·4	..	..	..	..	..	..	256	..	11,300 to 14,200	..	..	..	..	18
..	3·5	0·1	0·1	0·1	..	24·7	·6	3	0·4	100	..	..	3	<0·1	..	..	19
..	3·9	3·8	0·2	0·9	..	19·5	20	120	0·7	95	..	Trace	..	..	..	..	20
40	25·6	<0·1	0·1	0·1	..	2·6	3	3	0·3	11	..	3	..	..	12	..	21
..	2·3	0·2	<0·1	0·5	3·1	22·2	6	17	4·1	90	..	..	..	..	..	..	22
..	21·5	<0·1	<0·1	0·1	0·9	5·8	3	6	0·1	24	..	..	..	..	..	..	23
..	24·0	<0·1	0·1	0·2	..	4·1	43	3	0·1	17	..						24
..	27·3	<0·1	<0·1	0·1	..	1·0	11	3	0·3	4	..						25
..	27·9	0·1	<0·1	<0·1	..	0·4	3	3	0·4	2	..	..	<4	..	..	..	26
..	27·7	<0·1	0·1	0·1	..	0·5	3	3	0·3	3	..						27
1000	1·6	11·2	0·2	2·0	0·1	11·1	124	423	12·4	91	..	31	1,704	12·0	1,113	..	28
..	2·2	10·1	0·5	2·4	..	13·1	45	594	6·1	98	..	..	909	7·7	..	..	29

Honey contains about 80 per cent of sugars, principally fructose and glucose. It may contain a little vitamin C but no other vitamins.

APPENDIX I

Biological Value of the protein in certain foodstuffs

Foodstuffs	Biological Value
Barley	71
Cambu	83
Cholam	83
Italian millet	77
Maize, tender	60
Maize, Yellow	60
Oatmeal	65
Ragi	89
Rice, raw polished	86
Wheat, whole	67
Bengal gram	76
Black gram	64
Cow pea	61
Field Beans	41
Green gram	51
Horse gram	59
Lablab pea	65
Lentil	58
Red gram	74
Soya bean	54
Amaranth leaves	72
Cabbage leaves	76
Drumstick leaves	41
Ipomea leaves	67
Sesbania leaves	64
Potato	67
Sweet potato	72
Brinjal	71
Cluster beans	51
Ladies fingers	82
Almond	58
Cashewnut	72
Coconut	58
Gingelly seeds	67
Linseed	78
Ground-nut, raw	57
Ground-nut, roasted	56
Buffalo meat	60
Cow muscle	69
Goat meat	60
Pork meat	77
Beef, liver	77
Steam-dried ruhee fish, (*Labeo rohita*)	79
Steam-dried hilsha (*Clupea ilisa*)	70
Egg, whole	94
Egg, white	83
Milk, cow's	85
Skimmed milk powder	83

APPEN

Equivalents in some

Name of foodstuff	Botanical name	Hindustani	Tamil	Telugu
				Cere
Bajra or cambu	Pennisetum typhoides.	Bajra.	Cambu.	Gantelu.
Barley	Hordeum vulgare	Jau.	Barliarisi.	Barli Biyyam.
Cholam	Sorghum vulgare	Juar.	Cholam.	Jonnalu.
Italian millet	Setaria Italica	Kangni	Thenai.	Korralu.
"Kootu" or Buckwheat	Fagopyrum esculentum.	..	..	..
Maize, tender	Zea Mays	Makai, Makka.	Makkacholam.	Mokka Jonnalu.
Maize, dry	Do.	..	Do.	Do.
Maize flour	Do.	..	..	Mokka Jonna Pindi.
"Makhana"	..	..	..	..
Oatmeal	Avena sterilis	Jai.	..	..
Pani varagu	Panicum miliaceum	China.	Pani varagu.	..
Ragi	Eleusine coracana	Mandal, Okra.	Ragi.	Ragulu, Cholu.
Rice, raw, home-pounded	Oryza sativa	Arwa Chawal.	Arisi, Kaikuthu, Pachai.	Dampudu, Biyyam Pachi.
Rice, parboiled, home-pounded.		Usna Chawal.	Arisi, Kaikuthu, Puzhungal.	Dampudu Biyyam Uppudu.
Rice, raw, milled		Arwa Chawal.	Arsi, Mill, Pachai.	Marabiyyam, Pachi
Rice, parboiled, milled		Usna Chawal.	Arisi, Mill, Puzhungal.	Mara Uppudu Biyyam.
Rice, white, puttu		..	Arisi, Vellai, Puttu.	Thella Biyyam.
Rice, black puttu		..	Arisi, Karuppu, Puttu.	Nalla Biyyam.
Rice flakes		Chowla.	Arisi, Aval.	Atukulu.
Rice, puffed		Murmura.	Arisi, Pori.	Pelalu.
Rice, raw, unmilled (prepared in wooden grinder).			Arisi, Pachai, Marayandiram.	Che Biyyam, Pachi.
Rice, raw, home-pounded			Arsi, Pachai, Kaikuthu.	Dampudu Biyyam. Pachi.
Rice, raw, milled.			Arisi, Pachai, Mill.	Mara Biyyam, Pachi.
Sago	..	..	..	..
Samai	Panicum miliare	Kutki, Sanwali.	Samai.	..
Sanwa millet	Echinochloa colona Link. var frumautacea	Sawan.	..	Pedda Wundu.
"Singhara", dry	..	..	..	..
Talipot flour	Caryota urens.	..	Coondapanai.	Mhar Madi.
Vermicelli	..	Siwain.	Semiya.	Semiya.
Varagu or Kodu millet.	Paspalum scrobiculatum.	Kodon, Kodra.	Varagu.	Variga.

DIX II

Important Indian Languages

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malayalam
als					
..	Bajra.	Bajri.	Bajra.	Bajri.	Kamboo.
..	Jaba Dhana.	Juv.	Job.	Jau.	Yavan.
Jola.	Janha.	Jwari.	Juar.	Juar.	Cholam.
..	..	Rala.	Syamadhan, Kangni.	Ral Kang.	Thina.
..	..	Kutu.	..	..	Kootu.
Yele Musukinu Jolu.	Kancha Maka.	Muka.	Kacha Bhutta.	Makai.	Pathamulla (Ilam) Cholam.
Vonugida Musukinu Jolu.	Sukhila Maka.	Muka.	Sukna Paka Bhutta.	Makai.	Unakku Cholam.
Joluda Hittu.	Maka Maida.	Muka Peeth.	Bhutta Churna.	Makaino Loat.	..
..	..	..	..	..	Makhana.
..	..	..	Jai.	..	Oat Mavu.
..	..	Ghotisanja.	China.	..	Pani Varagu.
Ragi.	Mandia.	Nachni.	..	Ragi, Bhav.	Moothari.
Kotnuda Akki.	Dhinkikuta Arua Chaula.	Tandool.	Atap Chowl (Dheki Chhata).	Hatna Chhandela Chokah.	Pachhari (Veetil Kuthiyathu).
Kotnuda Kusubalakki.	Dhinkikuta Usuna Chaula.	Tandool Ukda.	Siddha Chowl (Dheki Chhata).	Ukadello Chokha	Ari Pathivevichua Veetil Kuthiyathu.
..	Kalakuta Arua Chaula.	Tandool Sudlela.	Atap Chowl (Kolchhata).	Chokha.	Pachhari Millil Kuthiyathu.
..	Kalakuta Usuna Chaula.	Tandool Ukda Sudlela.	Siddha Chowl (Kolchhata).	..	Ari. Pathi Vevichhu. Millil Kuthiyathu.
..	..	..		..	Velutha Puttari.
..	..	..	..	..	Karutha Puttari.
Avalukki.	Chuda.	Pohe.	Chaler Khood.	Pohva.	Avil.
Puri.	Mudhi.	Murmure.	Muri.	Mumra.	Pori.
..	Akhyata Chaula.	..	Atap Chowl (Dheki Chhata.)	..	..
..	..	Tandool-Hat Sudicha.	Atap Chowl (Dheki Chhata.)	..	..
..	..	..	Atap Chowl (Kulchhata).	..	..
..	..	Sabudana.	..	Sabudama.	Jauwari.
Semai.	Suan.	Sava.	Kangni.	..	Chama.
..	Suan.	Shamula.	China.	Sawo.	Samva thina.
..	..	..	..	..	Unakkan Singhara.
..	..	Tad.	..	..	Kudappanna Mavu.
Shavige.	Simai.	Shevaya.	Sewai.	..	Gottambunool Mavu (Semiya).
..	..	Harik.	Kodoadhan.	..	Varogu (Kodu. thiana).

APPENDIX

Name of foodstuff	Botanical name	Hindustani	Tamil	Telugu
				Cere
Wheat, whole	Triticum aestivum	Gehum.	Godumai.	Godhumalu.
Wheat flour, whole (atta)	Do.	..	Muzhua Godumai Ma.	Godhum Pindi.
Wheat flour, refined	Do.	Maida.	Maida Mavu.	Maidha Pindi.
				Pul
Bengal (gram with outer husk).	Cicer arietinum	Chana.	Muzhu Kadalai.	Sanagalu.
Bengal gram, roasted (without outer husk).	Do.	Bhuna Chana.	Kadalaiparuppu.	Sanaga Pappu, Vepudu.
"Bhetmas"	Glycine hispida	Bhatwans.	..	..
Black gram (without outer husk).	Phaseolous mungo	Urd.	Ulutham paruppu.	..
Cow gram	Vigna catiang	Lobia Bada.	Karamani.	Alachandalu.
Field bean, dry	Dolichos lablab	Val.	Mochai.	Adavichikkudu.
Green gram (with outer husk).	Phaseolus aureus Roxb.	Mung.	Pachaipayaru.	Pesalu.
Horse gram	Dolichos biflorus	Kulthi.	Kollu.	Ulavalu.
"Khesari"	Lathyrus sativus	..	..	Lamka.
Lentil (Masur dhal)	Lens culinaris Medic	Masur.	Misur Paruppu.	Misur Pappu.
Peas, dried	Pisum sativum	Bada Mattar.	..	Endu Pattani.
Peas, roasted	Do.	Bhuna Mattar.	..	Vepudu Pattani.
"Rajmah"	..	Fransbean.	..	..
"Rawan"	Vigna Simensis	Lobhia.	..	..
Red gram (Dhal arhar) (without outer husk).	Cajanus Cajan	Arhar.	Tuvaram Paruppu.	Kandi Pappu.
Soya bean	Glyine max. Merr.	Bhat.	..	..
				Leafy
"Agathi"	Sesbania grandiflora	Agasti or Jaint.	Agathi.	Avesi.
Amaranth, tender	Amaranthus tricolor	Lal Choalai, Lal sag.	Mulaikeerai.	Thota Koora.
Amaranth, spined	Amaranthus spinosus	Kantewali Choalai.	..	Mulla Thota Koora.
Bamboo, tender shoots	Bambusa bambos	Bans.	Moongil Kuruthu.	Vaduru Chiguru.
"Bathua" leaves	Chenopodium album	..	..	..
Bengal gram leaves	Cicer arietinum	Sag Chana.	Kadali Ilaigal.	Sanaga Aku.
Brussels sprouts	Brassica oleracea gemifera.	..	..	..
Cabbage	Brassica oleracea-capitata.	Band Gobhi.	Mutta Cose, Goskeerai.	Goskura.
Carrot leaves	Daucus carota	Sag Gajar.	Manjal Mullangi Keerai.	Gajjara Aku.

II—contd.

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malayalam
als—contd.					
Godhi.	Gahama.	Gahu.	Gom Asta.	Ghau.	Muzhu Gothambu.
Godhi Hittu	Atta.	Gahu Kuneek.	Atta (Jatabhanga).	Ato.	..
Maida.	Maida.	Gahu Kuneek.	Maida.	..	Sudhicheytha Gothambu Mavu.
ses					
Kadale.	Buta.	Hurbura.	Chola (Gota).	Chana.	Kadala.
Huri Kadale.	Bhaja Bura.	Futana.	Bhaja Boot (Chhatu).	Futana.	Varutha Kadala
..	..	..	..	..	Bhetmas.
Bili Uddu.	Biri.	..	Mashkalai (Chhata).	..	Uzhunnu.
Thadaguni.	Chani.	Kuleeth.	Barbati.	..	Mochhak Kotte.
Avare.	Baragudi.	Walpapdi.	Sukna Sim.	Wal Papdi.	Val, Unangiyathu.
..	Muga.	Mug.	Mug.	Mag.	Cheru Payaru.
Huruli.	Kolatha.	Kuleeth.	Kulthi Kalai.	Kuleeth.	Muthira.
..	Khesari.	Lakh Dal.	Khesari.	Lakh.	Khesari.
Masur Bele.	Masura.	Masur.	Musuri.	Masur.	Masura Payaru.
Vona Batani.	Matara.	Vatana.	Sukna Matar.	Vatana.	Pattani Payaru, Unangiyathu.
Hurida Batani.	Bhaja Matara.	..	Bhaja Matar.	Vatana.	Pattani Payaru, Varuthathu.
..	..	..	Barbati.	..	Rajmah.
..	Suji.	Chawali.	Barbati Sim.	Chola.	Rawan.
Thugare Bele.	Harada.	Toor.	Arhar Dal.	Tur.	Thuvara.
..	..	Soya.	Gari Kalai.	Soya.	Soyabeen.
Vegetables					
Agase.	Agasti Saga.	Agasti.	Baug Ful.	Agathio.	Agathi.
Yele Dantu.	Khada Saga.	Math.	Banopata Nate.	Tandaljo.	Elam Cheru Cheera
Mulla Dantu.	Kanta Neutia Saga.	Kate Math.	Kanta Nate.	Kantemedant.	Mullan. Cheru Cheera.
..	Karadi, Baunsa Gaja.	Kalki Pan.	Bansh Ankur Bana.	Vasasni Kupal.	Moongil elam Kombugal.
..	Bathua Saga.	Chandan Bathua	Beto Sag.	.	Bathua Elakal.
Kadale Soppu.	Chana Saga.	Hurbhura Pan.	Chola Sag.	Chanana pan.	Kadala Elakal.
Mara Kosu	Chhota Bandha Kobi.	..	Bilati Bandha Kopee.	..	Brussels Goves.
Matte Kosu.	Bandha Kobi.	Kobi.	Bhandha Kopee.	Kobi.	Muttagose.
Gajari Soppu.	Gajara Patra.	Gajar Pan.	Gajar Sag.	Gajarna Pan.	Karat Elakal.

Name of foodstuff	Botanical name	Hindustani	Tamil	Telugu
				Leafy
Celery	Apium graveolens var. dulce.	Ajwain Ka Patta.	..	
Colombo keera	..	..	..	
Coriander	Coriandrum sativum	Dhania.	Kothamalli.	Kottimiri.
Curry leaves	Murraya koenigii	Gandhela.	Karuveppilai.	Karivepaku.
Drumstick	Moringa oleifera	Saijan.	Murungai.	Mulagakada.
Fenugreek	Trigonella foenum-graecum.	Methi.	Venthiam.	Mentulu.
Garden cress	Lepidium sativum	Halim.	Alivirai.	Adityalu.
"Gogu" or Red sorrel	Hibiscus sabdariffa	Patwa or Palsan.	..	Gogu.
Gram leaves	Cicer arietinum	..	Kadalai Ilaigal.	Sanaga Aku.
Ipomoea	Ipomoea reptans	..	..	..
Khesari leaves	Lathyrus sativum	Khesari Ka Sa.	..	
Lettuce	Lactuca sativa	Salad.	..	..
Lettuce tree leaves, tender.	Pisonia alba.	..	..	
Lettuce tree leaves, matur.	Do.	..	..	..
"Manathakkali"	Solanum nigrum	Makoy.	Manathakkali.	Kamanchichettu.
Mint	Mentha Spicata	Paudina.	Pothina.	Pothina.
Neem, mature	Azadirachata indica		Veppa Ilai.	Vepa.
Neem, tender	Do.	..	Veppan Kolunthu.	Latha Vepa.
Parsley	Petroselinum crispum	..	..	..
"Ponnanganni"	Alternanthera amoena	..	Ponnanganne.	..
Rape leaves	Brassica napus	Sag Sarsoon.	..	
Safflower leaves	Carthamus tinctorius	..	Sendurkam.	Kusumbha.
Spinach	Spinacia oleracea	Palak.	Pasalai Keerai.	Dumpabucchale.
Soya leaves	Glycine max Merr	Soya Sag.	..	..
Water cress	Nasturtium officinale	..	..	
				Roots and
Beet root	Beta vulgaris	Chuquandar.	..	
Carrot	Daucus carota	Gajar.	Manjal Mullangi.	Pecheha Mullangi.
Colocasia	Colocasia esculenta	Arwi.	Seppan Khizhangu.	Chama Dumpa.
Onion, big	Allium cepa		Periya Vengayam.	Pedda Nirulli.
Onion, small	Do.	..	Chinna Vengayam.	Chinna Nirulli.
"Onthalai gasu"	Dioscorea alata	..		Gunapendalum.
Parsnip	Pastinaca sativa			
Potato	Solanum tuberosum	Alu.	Urullai Kizhangu.	Urula Gaddalu. Alu Gaddalu.
Radish (pink)	Raphanus sativus	Muli (Lal).	Sivappu Mullangi.	Erra Mullangi.
Radish (white)	Do.	Muli.	Vellai Mullangi.	Thella Mullangi.

II—contd.

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malavalam
Vegetables—contd.					
..	Juani Patra.	..	Randhuni Sag. Chanu.	Ajmana Pan.	Sellary.
..	Kanta Kosala.	.	..		
Kothambari.	Dhania.	Kothimbir.	Dhane Sag.	Kothmer.	Kothamalli.
Kari Bevu.	Bhrusunga Patra.	Kadhi Limb.	Bursunga.	Mitho-Limbdo.	Karivepila.
Murige.	Sajana Saga.	Shevuga Pan.	Saijna Sag.	Saragwani Sheng	Muringa Kaya.
.	Methi Saga.	Methi.	Methi Sag.	Methi.	Uluva.
.	..	Ahaliv.	Halim (Chandrasura).	Asalio.	Thotta Kaykanikal.
..	Nalite Saga.	Ambadi.	Mesta (Patwa).	..	Gogu.
Kadale Soppu.	Mathura Saga.	.	Chola Sag.	Chanana Pan.	Pavarilakal.
..	Kandamula Saga.	Nalichi Bhaji.	Kalmi Sag.		Ippomia.
..	Khesari Saga.	.	Khesari Sag.	..	Kesari Elakal.
.	Leteus Saga.	.	Salad.	Salat.	Uvarcheera.
.	.	.	Kachi Salad Pata.	.	..
	.	..	Paka Salad Pata.		.
Ganika.	..	.	Kakamachi, Mako.		Manathakkali.
..	..	..	.		Thulasi Chedi.
Pudina.	Podana Patra.	Pudeena.	Pudina Sag.	Fudino.	Mintha Veppila.
Balita Bevu.	Nima Patra.	Kodu Limb.	Paka Neem Pata.		Flam Veppila.
Vele Bevu.	Nima Kadha.	..	Kachi Neem Pata.	.	Kothambelari.
..	.	.	.	.	Cheeru (Puthecna).
	Madarang.	.	Khanchari.	.	Ponnanganni.
.	Shorisa Saga.		Sarisa Sag.	.	Mundiri Elakal.
	..	Kusumba.	Kusumphal, Kajireh.		Kusumbha Poorilkal.
	Palanga Saga.	Palak.	Palang Sag.	Palak.	Vasalacheera.
.	Soya Patra.	.	Gouri Kalai Sag.	..	Soya Elakal.
.	Brahmi Sag.	..	Halim.	.	.
Tubers					
.	Bita.	Beet.	Beet.	Beet.	Beet Root.
.	Gajara.	Gajar.	Gajar.	Gajar.	Karat.
Keshave.	Saru.	Alu Kanda.	Kachu (Kalo Kachu, Mankachu)	Alvi.	Chembu.
Dodda Erulli.	Uli Piaja.	Kanda.	Bara Pyaj.	Dungli.	Ulli (Valutha).
Chikka Erulli.	Piaja.		Chota Pyaj.		Ulli (Cheruthu).
	.		.		Onthalaigasu.
	.		..		Parspin Kizangu.
Urula Gadda	Alu.	Batata.	Gol Alu.	Batata.	Urula Kizangu
Kempu Mullangi.	Nali Mula.	Mula.	Mula (Lal).	Mogari.	Mullangi (Chuvanna Tharam).
Bili Mullangi.	Dhala mula.	Mula.	Mula (Sada).	Safet Mula.	Mullangi (Veluthu Tharam).

APPENDIX

Name of foodstuff	Botanical name	Hindustani	Tamil	Telugu
				Roots and
Sweet potato	Ipomeoa batatas	Shakarquand.	Sarkarai Valli Kizhangu.	Dumpalu, Chelagada Dumpalu.
Tapioca	Manihot esculenta	Maravali, Simla Alu.	Maravalli Kizhangu.	Karrapendalam.
Yam (elephant)	Amorphophallus campanulatus.	Zamin Kand.	Senai Kizhangu.	Surei Kanda.
Yam (ordinary)	Typhonium trilobatum.	Ratalu.	Karunai Kizhangu.	Kanda.
				Other
Amaranth, stem	Amaranthus gangeticus.	Cholai ki Dandi.	Keerai Thandu.	Thota Koora kada.
Artichoke	Cynara scolymus	Hattichak.	..	..
Ash gourd	Benincasa hispida	Petha.	Kalyana Pushinikai.	Budedagummidi.
Bitter gourd	Momordica charantia	Karela.	Pavakkai.	Kakara.
Bitter gourd (small variety.)	Do.	..	..	Agakara.
Brinjal	Solanum melongena.	Baingan.	Kathirikai.	Vankayi.
Broad beans	Vicia faba.	Sem.	Avaraikkai.	Pedda Chikkudu.
Calabash cucumber	Lagenaria siceraria	Lowki, Ghia Kadu.	Soraikki.	Sorakaya.
Cauliflower	Brassica olercea botrytis.	Gobhi.	Kovippu.	Kosugadda.
"Cho-cho" marrow	Sechium edule	..	..	..
Celery stalks	Apium graveolens var. dulce.	Ajwan ki Dandi.	..	..
Cluster beans	Cyamopsis tetragonoloba.	Guar ki Phalli.	Kothavarangai.	Goruchekkudu Kayalu.
Colocasia stems	Colocasia esculenta	Banda, Arwi Ki. Dandi.	..	..
Cucumber	Cucumis sativus	Kakari.	Kakkirikkai.	Dosakaya.
Double beans	Faba vulgaris	Chastang.	..	..
Drumstick	Moringa oleifera	Saijan.	Murungaikai.	Mulagakada.
French beans	Phaseolus vulgaris	Bakla.	..	..
Ipomoea stems	Ipomoea reptans	..	..	..
Jack tender	Artocarpus heterophyllus.	Kathal.	Pila (Pinchu).	Letha, Panasa.
Jack fruit seeds	Do.	Kathal Bichi.	Pilakkottai.	Panasa Ginjalu.
"Kandan Kathiri"	Solanum xanthocarpum.	Kateli.	Kandan Kathiri.	Vamkuda.
"Kovai" fruit, tender	Coccinia cordifolia	Kundree.	Kovaikai.	Donda Kayi.
Knol-khol	Brassica caulorapa	Kohl Rabi.	..	..
Ladies fingers	Abelmoschus esculentus.	Bhindi.	Vendaikai.	Bendakayi.
Leeks	Allium porrum	Vilayaiti Lasson.	..	
Mango, green	Mangifera indica	Am (keri).	Mangai.	Mamidikayi.
"Nellikai" (amla)	Phyllanthus emblica	Amla.	Nellikai.	Usirikayi.

II—contd.

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malayalam
Tubers—contd.					
Genasu.	Kanda Mula.	Ratale.	Ranga Alu.	Sakkaria.	Chakkara Kisangu.
Mara Genasu.	Katha Kanda.	..	..	..	Marakizangu.
Dodda Suvarna Gedda.	Hatikhojia Alu.	Suran.	Ol.	Suran.	Chena (Valuthu).
Chikka Suvarna Gedda.	Khamba Alu.	Goradu.	Ghet Kachu, Ratalu.	Ratalu.	Chena (Sadharana).
Vegetables					
Dantu.	Khada.	Rajgira	Nate Danta.	Rajgiro.	Cheru Cheerathandu.
..	..	..	Hatichoke.	..	Artichoke.
..	Pani Kakharu.	Kohala.	Chal Kumra.	..	Elavan (Kumbelanga).
Hagala.	Bada Kalara.	Karle.	Karala.	Karela.	Kayppakka.
..	Thusi Kalara.	..	Uchchhe.	..	Kayppakka Cherutharam.
Badane.	Baigana.	Vange.	Begun.	Ringna.	Vazuthininga.
Chappara Da ere	Simba.	..	Makhan Sim.	Faïda Papdi.	Av-rakka.
Sorekai.	Lau.	Pandhara, Bhopala.	Lau.	Dudhi.	Churakkai.
Hukosu.	Phul Kobi.	Phool Kobi.	Phul Kopee.	Phul Kobi.	Kaliflower.
Seemai Badane.	Phuti Kakudi.	..	..	..	Cho Cho (Kambu).
..	Juani Nada.	..	Randhunidanta.	..	Selary Thandu.
Gori Kayi.	Guanra Chhuin.	Govari.	Jhar Sim.	Govar.	Kothavara.
Keshave Dantu.	Saru Nada.	..	Kachu Danta.	..	Chembin Thandu.
Southai Kayi.	Kakudi.	Kakari (Khire)	Sasha.	Kakdi.	Vellari.
..	Bean.	..	..	Papdi.	Avara.
Murigui Kayi.	Sajana Chhuin.	Sheruga Sheng.	Saijna Danta.	..	Muringakkai.
Huruli Kayi.	Bean.	Pharashee.	..	Fansi.	Frenchavata (Seema Avare).
..	Kandamila Danka.	Nalichi Bhaji.	Kalmi Danta.	..	Ipomiya Thandu.
Yele Halasu.	Panasa Katha.	Phunas.	Echore.	Kawla Phanas.	Idichakka.
Halasina Beeja.	Panasa Manji.	Athali.	Kathal Bichi.	Phanas Na Bi.	Chakkakkuru.
	Bheji Baigana.	..	..	..	Kandan Kathiri.
..	Kunduru.	Tondale.	Telakucha.	..	Elam Kovakka.
..	Ulkobi.	Knol-Khol (Nol-Kol).	Ole Kapi.	Nolkol.	Nool-kol.
Bende.	Bhendi.	Bhendi.	Dherash.	Bhinda.	Vendakka.
..	Bilati Rasuna.	Khorat.	Bilati Payaj.	..	Vellulli.
Mavina Kayi.	Kancha Ambu.	Amba.	Kachulcha Am.	Keri.	Manga (Pacho).
Nelli Kayi.	Anla.	Anvla.	Amlaki.	Anla.	Indian Nellikke.

Name of foodstuff	Botanical name	[illegible]	[illegible]	[illegible]
				Other
Nut of Avocado pear	Persea drymifolia			
Onion stalks	Allium cepa	Pyaz.		Uli Kadalu.
[illegible]	Trichosanthes dioica	..	..	
Peas, English	Pisum sativum	Matar	Pattani, Pachai.	Battani, Pachi.
Pink beans	Phascolus vulgaris	Babril	..	
Plantain flower	Musa sapientum	Kele ka Phul.	Vazhaippu.	Arati Puwu.
Plantain, green	Do.	Kele ka Phate.	Vazhaikkai.	Arati Kayi.
Plantain stem	Do.	Kele ka Tana.	Vazhaithandu.	Arati Davva.
Pumpkin	Cucurbita maxima	Kaddu.	Parangikkai.	Gummadi Kayi.
Rape plant stem	Brassica napus	Sarson ki Dandi.	..	
Rhubarb stalks	Rheum Rhaponticum	Revand-chini.	Nattu ireval-Chinni.	Nattu Pasapu Chinna Gaddha
Ridge gourd	Luffa acutangula	Torai.	Pirkkankai.	Beerakai.
"Singhara" or water chestnut.	Trapa bispinosa	Singhara.	Pauri Mattaisel.	Kubayakam.
Snake-gourd	Trichosanthes anguina	..	Podalangai.	Potlakayi.
Spinach, stalks	Spinacia oleracea	Palak ki Dandi	..	Bachala Kada.
"Sundakai" dry	Solanum torvum	..	Sundakkai Vethal.	Usthikaya.
Sword beans	Canavalia gladiata	..	Kattu Thambartam.	Adavithamaa.
"Tinda" tender	Citrullus vulgaris	..	..	..
Tomato, green	Lycoperiscon esculentum.	Vilayti Baingan	Thakkalikai.	Cheema Vankayi.
Turnip	Brassica rapa	Shalgham.	..	..
Vegetable marrow	Cucurbita pepo	Safedh Kaddu.	..	Buddadi Gummadi.
				Nuts and
Almond	Prunus amygdalus	Badham.	Badam, Vadamkottai	Badam Kayi.
Cashew nut	Anacardium occidentale.	Kaju.	Mundiripparuppu.	Jeedi Pekka.
Coconut	Cocos nucifera	Nariyal.	Thengai.	Gobbari Kayi.
Gingelly seeds	Sesamum indicum	Til.	Ellu.	Nuvvulu.
Ground-nut	Arachis hypogea	Moongphali.	Nilakkadalai.	Veru Sanaga Kayi.
Ground-nut, roasted	Do.	Bhuni Mongphali.	Varutha Nilakkadalai.	Vachina Veru Sanaga Kayi.
Linseed seeds	Linum usitatissimum	Alsi.	..	..
Mustard seeds	Brassica campestris	Rai.	Kadugu.	Avalu.
Oyster nut	Telfairea pedata	..	..	..
Pistachio nut	Pistaria uera.	Pista.	..	..
Walnut	Juglans regia	Akhrot.	Nattu Akrotu Kottai.	Nattu Akroti Vittu.
"Arisithippili"	Piper clusii	..	Arisithippali.	..
Asafoetida	Ferula foelida	Hing.	Perungayam.	Inguva.

II—contd.

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malayalam
Vegetables—contd.					
					Avacado perakka kuru.
Erulli Soppu.	Piaja Sandha.	Pati.	Payaj Kauli.	Dunglina Dakhadi.	Ullierathandu.
	Potala.	Parwar.	Patol.	Padwal.	Parwar.
Seemai Batani.	Matara.	Vatana.	Bilati Motor.	Watana.	English payaru.
Kempu Huruli.	Nali Simba.		Lal Sim.	Valore.	Chuvanna Avara.
Balo Motho.	Kadali Bhanda.	Kel Phool.	Mocha.	Kelphool.	Vazha Koombu.
Bale Kayi.	Bantala Kadali.	Kele.	Kanch Kola.	Kela.	Vazhakka.
Dindu.	Kadali Manja.	Kelicha Khunt.	Thor.	Kelanu Thed.	Vazha thandu.
Kumbala.	Kakharu.	Lal Bhopla	Kumra.	Kohlu.	Kumbalanga (Mathan).
	Sorisa Nada.		Sarisa Danta.	Rainu Zad.	Mundhirnga Chedi Thandu.
			Reuchini Danta.		Variyath Thandu.
Heeraikai.	Janhi.	Dodka.	Jhinga.	Turia.	Peechinga.
	Pani Singhra.	Shinghara.	Paniphal.	Shingoda.	Singhara (Jala Sasyam).
Padavala.	Chachindra.	Pudwal.	Chichinga.	Pandola.	Padavalanga.
	Palanga Nada.		Palong Sag Danta.		Vasalicheera thandu.
Sondekai.			Titbaigum.		Sundakka (Unangiathu).
	Maharda.	Abaichi Sheng.	Kathsim.	Abbayni Shing.	Valavara.
				Giloda.	(Elam) Thinda.
Aasvru dapparu Chapparu Bandane	Kancha Bilati Baigana.	Tomato.	Kancha Bilati Begum.	Tamatu.	Pachhat thakkali.
	Salagama.	Vilayati gajar.	Shalgom.	Shalgam.	Tharkkari Kizangu.
Dil Pasand.	Goiu Phuti Kakuri.	Pandhara-Bhopla Kashi Bhopla.	Dhundul.		Bilathi Churrakka.
Oil-seeds					
Badami.	Badama.	Budam.	Badam.	Badam.	Badam.
Geru Pappu.	Lanka Ambu Manji.	Kaju.	Hijli Badam.	Kaju.	Parangiyandi.
Thengu.	Nadia.	Naral.	Narikal.	Nariel.	Thenga.
Acchellu.	Rasi.	Til	Til	Tal.	Ellu.
Kadale Kayi.	China Badam.	Bhui Moog.	China Badam	Bhoising.	Nilakkadala.
Hurida Kadale Kayi.	Bhaja China Badama.	(Bhui Moog) Bhajalelisheng.	China Badam.	Shekeli-shing.	Nilakkadala Varuthathu.
	Pesi.	Juwas.	Tishi.	Alsi.	Cheruchana Vithu.
Sasave.	Sorisa.	Mohori.	Sarisha.	Rai.	Kaduku.
Pisthaw.	Pista.	Pista.	Pesta.	Pista.	Pistasi Andi.
	Akhrot.	Akrod.	Akhrot.	Akrot.	Akrotandi (Aksho dakhai).
	Sarupipali.		Pipul.		Arisithippali.
Hingu.	Hingoo.	Hing.	Hing.	Hing.	Perungayam.

Name of foodstuff	Botanical name	Hindustani	Tamil	Telugu
				Condiments,
Cardamom	Elettaria cardamamum.	Elyachi.	Elakkai.	Elakkayi.
Chillies, green	Capsicum frutescens	Mirch, Hari.	Pachai Milagai.	Pachi Mirapakayi.
Chillies, dry	Do.	Mirch, Lal.	Milagai Vethal.	Endu Mirapakayi.
Cloves, dry	Syzygium aromaticum.	Laung.	Kirambu.	Endu Lavangalu.
Cloves, green	Do.	..	Pachai Kirambu.	Pachi Lavangalu.
Coriander	Coriandrum sativum	Dhania.	Kothamalli Virai.	Dhaniyalu.
Cumin	Cuminum cyminum.	Zira.	Jeeragam.	Jeelakara.
Fenugreek seeds	Trigonella foenumgraecum.	Methi.	Venthiyam.	Menthulu.
Garlic	Allium sativum	Lehsan.	Ullipundu.	Vellulli.
Ginger	Zingiber officinale.	Adrak.	Inji.	Allam.
"Kandamthippili"	Piper roxburghii	..	Kandanthippili.	..
Lime peel	Citrus medica var. acida.	Neelre ka chpilkai.	Elumecham-thol.	Nimma Thoku.
Mace	Myristica fragrans	Javitri.	Jathi Pathiri.	Japathri.
Mustard	Brassica juncea	Rai.	Kadugu.	Avalu.
Nutmeg	Myristica Fragrans	Jaiphal.	Jathikai.	Jajikai.
Nutmeg, rind	Do.	..	Jathikai-thol.	..
Omum	Trachyspermum ammi	Ajwan.	Omum.	Vamu.
Pepper green	Piper nigrum	..	Pachai Milagu.	Pachi Miriyalu.
Pepper, dry	Do.	Kali Mircha.	Milagu.	Endu Miriyalu.
Tamarind, pulp	Tamarindus indica	Imli.	Puli.	Chinthapandu.
Turmeric	Curcuma domestica	Haldi.	Manjal.	Pasupu.
				Fru
Apple	Malus sylvestris	Seb.	..	..
Banana	Musa paradisiaca	Kela.	Nendaram, Valai.	Aratipandu.
Bilimbi	Averrhoa bilimbi	Kamrack.	Bilimbi.	Bili, bili, Kavalu.
Bread fruit	Artocarpus altilis	..	..	..
Bullock's heart	Anona reticulata	..	Ramsita Pazham.	Rama Phala.
Cape goose-berry	Physalis peruviana.	Rashbhari.	..	..
Cashew fruit	Anacardium occidentale.	Kajuka Phal.	Mundiri Pazham.	Jeedi Pandu.
Dates (Persian)	Phoenix dactylifera	Khajur.	Perit hampazham.	Khar Jooram.
Durain, ripe	Durizibethinus	..	..	..
Figs	Ficus carica	Anjeer.	Athi pazham.	Athipallu.
Grapes (Blue variety)	Vitis labruscana vinifera.	Angur.	Nila Drakshai.	Nalla Draksha.

II—contd.

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malayalam
Spices, etc.					
Yelakki.	Alaichi.	Velchi.	Elachi.	Elaychi.	Elathari.
Hasi Menasinakayi.	Kancha Lanka.	Mirchi Hirvi.	Kancha Lanka.	Lila Marcha.	Pachha Mulaku.
Vona Menasinakayi.	Sukhila Lanka.	Mirchi Lal.	Sukna Lanka.	Sukvela Marcha.	Kappal Mulaku.
Lavanga.	Sukhila Labang.	Luvang.	Sukna Labanga.	Lavang.	Karambu.
Hasi Lavanga.	Kancha Labang.	Do.	Kancha Labanga.	..	..
Kothaurilipa.	Dhania.	Dhane.	Dhania.	Kothmir, Libdhana.	Kothambalari.
..	Jira.	Jire.	Zira.	Jiru.	Jeerakam.
..	Methi.	Methi.	Methi.	Methi.	Uluva.
Bellulli.	Rasuna.	Lusoon.	Rashun.	Lasan.	Vellulli.
Shunti.	Ada.	Ale.	Ada.	Adu.	Inji.
..	Pipali.	Mire.	Pipul.	..	Kandanthippal.
Nimbe Sippai.	Lembri chopa.	Limb Sal.	Lelrekhoshu.	Limbuni chhal.	Cherunaranga tholi.
..	Jaitri.	Jaypatri.	Jayitri.	..	Jathipathri.
Sasave.	Sorisa.	Mohori.	Sarisa.	Rai.	Kaduku.
Jayikai.	Jaiphala.	Jai phal.	Jaiphal.	Jayphal.	Jathikka.
Jaikai Thogate.	Jaiphal-Chopa.	..	Jaiphal Bakal.	..	..
Oma.	Juani.	Onva.	Joan.	..	Omam (Ayamodakam).
Hasi Menasu.	Kancha Golmaricha.	Mire.	Kancha Golmarich.	..	..
Vona Menasu.	Sukhila Golmaricha.	..	Sukna Golmarich.	Mari.	Kurumulaku (Unangiyathu).
Hunise Hannu.	Tentuli.	Chinch.	Tentul.	Amli.	Puli.
Arashina.	Haladi.	Hulad.	Halud.	Haldhar.	Manjjal.
its					
Sebu.	Seu.	Sufurchand.	Apel.	Safarjan.	Apple Pazam.
Bale.	Kadali.	Kele.	Kala.	Kela.	Nendra Pazam.
Kamaleku	Karamanga.	..	Kamranga.	.	Bilimbi.
..	..	..	Madar.	.	Bilathi Chakka.
Ramaphala.	Sitaphala, Raja Amba.	Ram Phal.	Nona.	Ramphal.	Athamaram (Paran gichhakka).
..	..	Tipari.	Tepari.	Popta.	Kodi Nellikka.
Geru Hannu	Lanka Amba.	Kaju Phal.	Hijli Badam.	Kajupal.	Parangi Manga.
Kharjoora.	Khajuri.	Khajoor.	Khejur.	Khajur.	Persian (Ethhapazam).
..	..	..	..	..	Durian Pazham.
Anjura.	Dimiri.	Anjeer.	Dumoor.	Anjir.	Attipazam.
Kari Drakshi.	Angur (Kala).	Draksha.	Angur.	Draksha.	Mundiringa (Neel Jathi).

Fruits

Name of foodstuff	Botanical name	Hindustani	Tamil	Telugu
Grape fruit (Triumph)	Citrus paradisi	Vilaiti Chakatra.		
Grape fruit (Marsh's seedless)	Do.	Vilaiti Chakatra Bedana.		
Guava, country	Psidium guajava	Amrud.	Koyya Pazham.	Jami Pandu.
Guava, hill	Psidium cattelianum	..	Seemai Koyya Pazham.	Konda Jami Pandu.
Jackfruit	Artocarpus heterophyllus.	Kathal.	Pilapazham.	Panasa Pandu.
Jambu fruit	Syzigium cuminii	Jaman.	Nagapazham.	Narada Pandu.
"Karwanda," dry	Carrisa carandas	Karonda.	..	
Killapazham (small)	Vaccinium Leschenaulta.	..	Kilapazham.	..
"Korukkapalli"	Pithecolobium dulce	Manilla Imli.	Korukkappalli.	..
Lemon	Citrus limon	Meetha Neebu.	..	Gaji Nimma Pandu.
Lime	Citrus aurantifolia.	Neebu.	Elumichampazham.	Nimmapandu.
Loquat	Eriobotrya Japonica	..	..	..
Mango, green	Mangifera indica.	Am (keri)	Mangai.	Mamidi Kayi.
Mango, ripe	Do.	Am (Am)	Mampazham.	Mamidi Pandu.
Mango "Ankola"	Do.	..	Ankola mampazham.	..
Mangosteen	Garcinia mangostana.	..	Mangusthan.	..
Melon, water	Citrullus vulgaris	Tarbuz.	Darbusini (Piteha)	Tharbuja Pandu.
Orange	Citrus aurantium	Narangi.	Kichilipazham.	Kamala Pandu.
Orange, Washington Naval.	Do.	..	..	..
Orange, Jaffa	Do.	..	..	..
Palmyra fruit, tender	Borassus flabellifer	Tar.	Nongu.	Thati Pandu.
"Pannir koyya" or Rose apple.	Sizygaium jambos	..	Pannir Koyya.	..
Papayya, ripe	Carica papaya.	Papita.	Pappalipazham.	Boppay Pandu.
Passion fruit	Passiflora edulis	..	..	..
Peaches	Amygdalis persica	Arhu.	..	..
Pears, country	Purunus persica	Naspati.	Berikkai.	..
Pears, English	Pyrus Achras	..	Val Berikkai.	..
Pears, Avocado or Butter fruit.	Persea americana	..	..	..
Persimmon	Diospyros kaka	..	..	..
Pine apple	Ananas comosus	Annanas.	Annasipazham.	Anasa Pandu.
Plantain (ordinary)	Musa paradisiaca.	Kela.	Vazhai Pazham.	Arati Pandu.
Plantain, hill "Anaikombu".	..	Do.	Malai Vazhaipazham.	Konda Arati.
Plantain (red variety)	Musa rubrum	Alucha, Zardalu.	Sevvazhai Pazham.	Erraarati Pandu.
Plums (red variety)	Prunus domestica	..	Alpogada Pazham.	Alpogada-Pandu.

II—contd.

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malayalam
—contd.					
..	Bada-Angur.	..	Bilati Batabi (Jambura).		Mundri pazam (Tryamphi).
..	..	..	Bilati Batabi.	Chakotra.	Mundiri pazam (Kuruvillathathu).
Seebai.	Desi-Pijuli.	Peru.	Payara (Deshi).	Jam Phal.	Nattu Perakka.
Bella Seebai.	Pahadi Pijuli.	..	Payara (Pahari).	..	Malam perakka.
Halasu.	Panasa.	Phunas.	Kanthal.	Phanas.	Chakka.
Neralai.	Jamu-Koli.	Jhambhool.	Kalo Jam.	Jambu.	Jambu pazam.
..	Kendu.	Karwand.	Karamcha.	Karwanda.	Karwandai. (Unangiyathu.)
	..	..	..	..	Kilapazham (Cheruthara).
.	..	Vilayati Chinch.	Bilati Tetul.	..	Korukkapalli.
Gaja Nimbe	Kagajilembu.	Limbu.	Lebu (Mitha).	Limbu.	Poo Naranga.
Nimbe.	Gangakulia Lembu.	Mosumbe.	Lebu (Kagji or Pati).	Kadgi Limbu.	Cheru Naranga.
Laquot.	..	Lukat.	..	..	Lokvat pazam.
Mavina Kayi.	Kancha-Amba.	Amba Kaccha.	Kancha Am.	Keri.	Manga (Pachha.)
Mavina Hannu.	Pachila Amba.	Amba Pikleia.	Paka Am.	Keri.	Mampazam.
..	..	Do.	Am (Ankola)	..	Manga (Ankolla).
Mangusthan.	..	..	Mangustin.	..	Mangosteen pazam.
Kallangadi.	Taruvuja.	Kalingud.	Tarmuj (Jol).	Tarbuj.	Vattakka.
Kithilai.	Kamala.	Santre.	Kamala, Lebu.	Santra.	Madhura Naranga.
..	..	Mosumbe.	Kamala.	..	..
..	..	Mosumbe.	Kamala.	..	..
Thati Nungu.	Tala.	Shindi, Shirani.	Tal Shash.	..	Elam panamkai
Panneralai.	Chhota-Pijuli (Pahadi).	Jambhool.	Jamrul.	..	Pannir Koyya.
Pharangi.	Pachila Amrutbhanda.	Popai.	Paka Pepe.	Popaya.	Pappaya pazam.
..	..	..	Passion Phal.	..	Kireeda Pooched-Pazham.
Mara Sebu	Piccuu.	Peech	Peach Phal.	Peech.	Peechas pazam.
..	Desi Nasapati.	Nashpati.	Nashpati (deshi).	Naspatti.	Nattu Berikka.
..	Bilati Nasapati.	..	Nashpati (Bilati)	..	English Berikka.
..	..	..	Kulunashpati.	..	Avocado Berikka.
..	..	..	Gav.	..	Persiman Etha pasam.
Ananas.	Sapuri Panas.	Ananas.	Anarash.	Ananas.	Kayitha Chakka.
Bal.	Champa Kadali.	Kele.	Kala.	..	Vaza pazam (Sadharana).
Mala Balai.	Pahadi Kadali.	Do.	Kala (Pahari).	..	Mala vaza pazam (Anaikombu).
Kenivalai.	Amrutphani Kadali	Thambadi Keli.	Agniswar Kala.	Lal Kela.	Chenkadali pazam.
..	..	..	..	.	Drakshapazam (Chuvanna Tharam.)

Name of foodstuff	Botanical name	Hindustani	Tamil	Telugu
				Fruits
Pomegranate	Punica granatum.	Anar.	Madalampazham.	Danimma Pandu.
Pomeloe	Citrus maxima	Chakatra.	Bombalimas.	Edapandu Pampara Panasa.
Quince	Cydonia oblonga	Bihi.	Seemai Madalai-Virai	Seema Dalimma Vithulu.
Radish fruit	Raphanus sativus	Singri.	Mullangi.	Mullangi.
Raisins (preserved)	Vitis vinifera	Kishmish.	Kodimunthiri.	Kisumisuchettu.
"Seetha Pazham" or custard apple.	Anona squamosa	..	Seetha Pazham.	Seetha Phalam.
Strawberry	Fragaria vesca	Straberry.	..	..
"Thavittu Pazham"	Rhodomyrtus tomentosa.	..	Thavittu Pazham.	
Tomato, ripe	Lycopersicum esculentum.	Vilayeti Baingan.	Thakkali Pazham.	Seema Vanga Pandu.
Tree tomato	Cyphomandra betacea.	..	..	..
"Vikki Pazham" or wild Olive.	Eleocarpus oblongus	..	Vikkipazham.	..
Wood apple	Limonia acidissima	Kaith.	Vilampazham.	Velaga Pandu.
Tamarind, pulp	Tamarindus indicus	Imli.	Puli.	Chintha Pandu.
Zizyphus	Zizyphus mauritiana	Ber.	Elanthapazham.	Regu.
				Flesh
Beef (muscle)		Gai ka Gosht.	Mattu eraichi.	Go Mamsamu.
Crab (muscle)		Kekra.	Nandu.	Endraga Peetha.
Egg, duck		Batakh ka Anda.	Vathu Muttai.	Bathu Guddu.
Egg, hen		Murgi ka Anda.	Kozhi Muttai.	Kodi Guddu.
Fish (Mangalore, big fish)		Machhli.	Meen.	Chapa.
Fish (Mangalore, small fish)		..	Meen.	
Fish "Vajra"			Meen.	
Liver, sheep		Kaleji (Bher).	Attu Eeral.	Gorrai Karjamu.
Mutton (muscle)		Bakri ka Gosht.	Attu Eraichi.	Mamsamu.
Pork (muscle)		Suar ka Gosht.	Panni Eraichi.	Pandi Mamsamu.
Prawn (muscle)		Jhinga.	Era.	Royya.

II—contd.

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malayalam
—concld.					
Dalimbari.	Dalimba.	Dalimb.	Dalim.	Dalamb.	Mathalampazam.
Chakkota.	Batapi-Lembu.	Papnas.	Batabi-Jambura.	Papnus.	Pomelo pazam.
..	..	..	Bilati Bael.	..	Vilvam (Kuvalam).
Mullangi.	..	Dingri.	Bilati Mula.	Dingri.	Mullangikai.
Drakshi.	Kismis.	Manuka.	Kismis.	Khismis.	Unakku Mundiringu (Sarkarayilittu vechathu).
Seetha Pala.	Ata (Badhial).	Shita Phal.	Ata Phal.	..	Seetha pazam.
..	Staberi.	Straberi.	..	Strawberry.	Strabery pazam.
..	Jangli Pijuli.	..	Bilati Begun.	..	Thavittu pazam.
Chappara Badane.	Bilati Baigana.	Tomato.	..	Paka Tamata.	Thakkali pazam.
..	..	..	..	..	Marathakali.
.	..	..	Jal Pai.	..	Vikki pazam.
Bela.	Kaitha.	Kuvath.	Kathbael.	Kothu.	Vilam pazam.
Hunise.	Tentuli.	Chinch.	Tentul.	..	Puli.
Yelachi.	Barakoli.	Bor.	Kul.	Bor.	Eilanda pazam.
Foods.					
Danda Mamsa.	Gomansa.	Go-Mans.	Gomangso (Peshi).	Gomas.	Gomamsam (Dasa).
Nalli Mamsa.	Kankada.	Khekra.	Kankara (Peshi).	Karachlo.	Nhandu (Dasa).
Bathu Motte.	Bataka Dimba.	Ande, Budak.	Dim (Pantihash).	Batak-Nu-Indu.	Vatthu Mutta.
Koli Motte.	Kukkuda Dimba.	Ande, Kombdi.	Dim (Murgi).	Margi-Nu-Indu.	Kozhi Mutta.
Mangalore Dodda Meena.	Bada Machha.	Masali.	Matsha (Bara Mangalore).	Machhli.	Malsyam Mangalapurathu Ninnu Kittunna Viliya Malsyam.
Mangalore Chikka Meena.	Chhota Macha.	Masali.	Matsha (Chota Mangalore).	..	Malsyam (Mangalapurathuninnu Kittunna Cherya Malsyam).
..	Gania Machha.	Masali.	Matsha (Vajra).	..	Vaijra Malsyam.
..	Mendha Kalija.	Kaleej.	Mete (Vera).	Kaleju.	Attin Karalu.
Mamsa.	Mansa (Chheli or Mendha).	Mans, Sheli.	Vera Mangso (Peshi).	Ghetanu Gos.	Attirachhi (Dasa).
Handi Mamsa.	Ghusuri Mensa, (Chingudi).	Mans, Dukar.	Sukar Mangso (Peshi).	Suvarnu Mas.	Panni erachhi (Dasa).
	Chingudi.	Jinga.	Bagda Chingri (Peshi).	Zinga.	Chemmeen (Dasa).

APPENDIX

Name of foodstuff	Hindustani	Tamil	Telugu
Milk and			
Milk, cow's	Gai ka Dudh.	Pasum Pal.	Avu Palu or (Geda palu).
Milk, buffalo's	Bhains ka Dudh.	Erumai Pal.	Barrae Palu.
Milk goat's	Bakri ka Dudh.	Attu Pal.	Meka Palu.
Milk, human	Aurat ka Dudh.	Thayin Pal.	Chanu Palu.
Curds	Dahi	Thayir.	Perugu.
Butter-milk	Matha.	More.	Majjiga.
Liquid Skimmed milk	..	Kadaintha Pal.	
Skimmed milk powder	..	Kadaintha Pal Thool.	
Cheese.	Panir.	Palkatti.	Junnu.
"Koa" (whole buffalo milk)	..	Theratti Pal.	Kova.
"Koa" (skimmed buffalo milk)	..	..	..
Miscellaneous			
Areanut (*Areca cathecu*)	..	Pakku.	Poka Kaya, Vakka.
Arrow-root flour (West Indian) (*Maraant arundinacea*).	..	Kuva Mavu.	Pala Gunda.
Betel leaves (*Piper betle*)	Pan.	Vethilai.	Thamala Paku.
Coconut, tender	..	Elanir.	Latha Gobbari.
Coconut water	.	Thengai Thannir.	Gobbari Kaya Niru.
Cod liver oil	Machhli ka Tel.	Meen Ennai.	Chapa Noonei.
Halibut liver oil	Machhli ka Tel.	Meen Ennai.	
Jaggery	Gur	Vellum	Bellum.
"Kalipakku"	..	Kalipakku.	
"Madapu ginja"	.		..
"Makhana"	.	..	.
Malted palmyra root	..	Panam Kizhangu.	Thegalu.
"Pappads"	Pappar.	Pappadam.	Appadam.
"Perandai" (*Vitis quadrangularis*)	..	Perandai.	
Red Palm oil (*Elaies guineensis*)	Surkh Khajur ka (African) Tel.	Sivappu Pana Ennai.	Yerra Thati Noonei.
Sago (*Metroxylon sago*)	..	Jevvarisi.	Saggu Biyam.
"Singhara", dry (*Trapa bispinosa*)	..	..	Neeti Badam.
Sugar cane juice	..	Karuppanchar.	Caharaku Rasam.
Sugar cane preserves	.	Karuppanchar.	Charaku Rasam.
Sugar cane (same cane as for above preserves)	.	Karumbhu.	Charaku Karra.
Toddy, sweet	Tarail.	Padaneer.	Thiyya Kallu.
Toddy, sweet (coconut)	.	Thennai Padaneer.	Kobbari Kallu.
Toddy, fermented (coconut)	..	Thennang Kallu.	
Toddy, fermented (obtained from a shop)	.	Kallu.	Kallu.
Yeast, dried	..	..	..

II—concld.

Kanarese	Oriya	Marathi	Bengali	Gujarati	Malavalam
Milk products					
Hasuvina Halu.	Cai Dudha.	Dudh, Gay.	Dudh (Garu).	Gaynu Dudh.	Pasuvin pall.
Yemme Halu.	Mainsi Dudha.	Dudh, Maaish,	Dudh (Mahish).	Bhesnu Dudh.	Eruma pal.
Adina Halu.	Chheli Dudha.	Dudh, Sheli.	Dudh (Sagal).	Bakrinu Dudh.	Attin pal.
Yede Halu.	Maa Dudha.	Dudh, Stri.	Dudh (Manush).	Strinu Dudh.	Mulappal.
Mosaru.	Dahi.	Dahi.	Dadhi.	Dahi.	Thayri.
Majjige.	Ghola Dahi.	Tak.	Ghol.	Chhas.	Moru.
..	Sarakadha Dudha.	..	Makhantana Dudh.	..	Padakalanha pal.
..	Sarakada Dudha Gunda.	..	Makhantana Churna Dudh.	..	Padakalauba palpodi.
Ginnu.	Chhena.	Khava.	Panir.	Paneer.	Palkatti.
Khova.	Khua.	..	Khoa Khir (Mahish Dudh).	..	Thani eruma pal Kondulla 'Kova'.
..	..	..	Makhantana Khoa.	..	Pada neekkiya Eruam Pal Kondulla 'Kova'.
Foodstuffs					
Adike.	Gua.	..	Supari.	Sopari.	Adakka.
..	Araroot.	..	Tavkeel.	..	Koovapodi.
..	Pana.	..	Pan.	Nagarvelna Pan.	Vettila.
Yel. Nee.	Paida.	Shahale.	Dab (Kanchi Narikel).	..	.
Thengu Nerru.	Paida Pani.	Naral Pani.	Narikel (Jol.)	Pani Natiyal	..
Cod Meen Yenne.	Kadamachha Tela.	..	Cod Matsha Tail.	Ko Machhlined Tel.	..
	Halibat Machha Tela.	..	Halibut Matsha Tail.	..	Halibu Meenenna.
Bella.	Guda.	Gul.	Gur.	Gol.	Vellam (Sarkara).
.	Kanchagua Sijha.		Lal Supari.	.	Kalipakku.
..	Ganjei, Pati.	..	..	..	..
..	Puskar.	..	Makhna.	Makhan.	..
..	Tala Kanda.	..	..	.	Africa Thengenna.
Happala.	Papada.	..	Papar.	Papad.	Pappadam.
Perundai.	Siju.	..	Har, Harbhanga.	.	Per...
..	Khajuri Tela (Nali)	..	Khejur Tail.	..	..
.	Sagudana.	Sabudana.	Sago.	Sabudana.	.
.	Sukhila Singada.	Shingada.	Paniphal (Sukna)	..	
Kubbina Rasa.	Akhu Dorua.	Uns Rasa.	Ikkhu Raush (Akh).	Sherdina Ras.	Karumbin Charu.
Kakambi.	..	..	Chini Shira.		.
..	Akhu.	..	Ikkhu.	..	.
Neera.	Khajuri Rasa.	Neera.	Mitha Tari.	Nira.	Chakkarakkallu.
Thengu Neeru.	Nadia Rasa.	..	Tari (Narikel).	..	Thenim Chakkarakkalu.
Henda.	Tadi.	Tadi.	..	..	Thengil ninnuedutha.
Angadi Henda.		Tadi.	Gajan Tari.	Tadi.	Pulicha Kallu Choppil ninnu Kittiyathu.
.	..	Khumir.	Yeast, Khamir.	Khamir.	Unangiva Sura Mandam.

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